



## TO STUDY DISTRIBUTION AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF *ESCHERICHIA COLI* FROM VARIOUS CLINICAL SAMPLES AT A TERTIARY CARE TEACHING HOSPITAL, IN SOLAPUR, MAHARASHTRA

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### ABSTRACT

*Escherichia coli* (*E.coli*) is one of the leading cause of UTI, and many other infections seen in humans, over the years due to increase rate of antimicrobial resistance among *E.coli* isolates there is growing concern worldwide as it has resulted in limited therapeutic options for treatment. **Aims & objectives-** To study distribution and antibiotic susceptibility pattern of *E.coli* in various clinical samples. **Material & method-** All samples received in Microbiology department at tertiary care hospital for culture and sensitivity were included in study. Culture positive sample with lactose fermenters were subjected to standard biochemical test for identification and antibiotic susceptibility testing was done along with distribution of *E.coli* in various samples was assessed. **Results-** Out of total 2585 samples received for culture & sensitivity, 1142 (44.17%) were culture positive of which 196 (17.16%) were *E.coli* isolates. Majority of *E.coli* isolates were from isolated from pus and wound swab 74 (37.75%) followed by urine sample 59 (30.10%). Antibiotic sensitivity was maximum for imipenem 57%, amikacin 38% and piperacillin tazobactam 35%, nitrofurantoin 24%. Highest resistance was noted for ampicillin 96.5%, quinolones 91.33%, cephalosporins 91.33%

### KEYWORDS :

### INTRODUCTION

*Escherichia coli* (*E.coli*) is a common inhabitant of human and animal gut but can also be found in water, soil and vegetation<sup>1</sup>. *E.coli* is one of the leading cause of UTI<sup>1,2,3</sup> and is among most common cause of blood stream infections<sup>4</sup>, wound infections, otitis media and other complication in human.

Over the time there has been swift development of antimicrobial resistance among *E.coli* which poses serious threat in treatment of even simple infections. Beta lactam antibiotics are most commonly used antimicrobials for empirical therapy, but production of  $\beta$ -lactamases is one of the most common cause of resistance in these bacteria to 5 due to which now-a-days there is rapid development of MDR and XDR resistance among *E.coli* strains. An isolate is considered MDR (Multidrug resistant) if it is resistant to all penicillins, cephalosporins including inhibition combination, fluoro quinolones, aminoglycosides. Extensively drug resistant (XDR) strains includes those isolates which are resistant to all drugs of MDR along with carbapenems<sup>5</sup>.

Various other mechanisms involved in drug resistance in *E.coli* includes efflux pump, porin channel, alteration along with production of various types of  $\beta$  lactamases<sup>6,7,8,9</sup>. Due to isolation of resistant strains of *E.coli* frequently in clinical samples, aim of our study is to find out the distribution of *E.coli* in various sample and to know the antibiotic susceptibility pattern for the same, which will guide in formulation of hospital based antibiotic policy and antibiotic stewardship program.

### MATERIAL AND METHODS

Various sample received in Microbiology department at tertiary care teaching hospital in Solapur for culture and sensitivity during July 2018 to October 2018 were included in the study. All samples were (except for blood and stool) subjected to gram's staining to provide provisional report and later inoculated on blood agar, Mac conkey agar, CLED media (in case of urine samples) and plates were incubated overnight at 37°C. Next day growth was noted, those samples showing growth of lactose fermenters were subjected to gram staining, standard biochemical test for identification and antibiotic susceptibility testing was done using Kirby bauer disk diffusion method as per CLSI guidelines<sup>10</sup>.

### RESULTS

Out of total 2585 samples received for culture & sensitivity, 1142 (44.17%) were culture positive of which 196 (17.16%) were *E.coli* isolates. Majority of *E.coli* isolates were from isolated from samples of pus and wound swab 74 (37.75%) followed by urine sample 59 (30.10%), stool 36 (18.36%), blood 15 (7.65%), vaginal swab 6 (3.06%), sputum 2 (1.02%), ascitic fluid 1 (0.51%), peritoneal fluid 1 (0.51%), pleural fluid 1 (0.51%), tracheal secretion 1 (0.51%) as shown in table-1.

**TABLE-1 Distribution of *E.coli* in Various Clinical samples**

SPECIMEN	NUMBER OF <i>E.coli</i> (n=196)	PERCENTAGE (%) of <i>E.coli</i>
BLOOD	15	7.65
SPUTUM	02	1.02
STOOL	36	18.36
VAGINAL SWAB	06	3.06
URINE	59	30.10
PUS & WOUND SWAB	74	37.75
TRACHEAL SECRETION	01	0.51
ASCITIC FLUID	01	0.51
PERITONEAL FLUID	01	0.51
PLEURAL FLUID	01	0.51

Infection caused by *E.coli* were more common among males 119 (60.71%) as compared to females 77 (39.28%). Age group most commonly involved was from 20- 40 years of age followed by 1-20 years of age, then 40-60 years of age. Least number of cases were reported in age group of 1 month to 12 months in both male and females as shown in table-2.

**TABLE-2 Distribution of *E.coli* Age group and Gender wise**

AGE GROUP	TOTAL No.	MALE	FEMALE	TOTAL PERCENTAGE(%)
1-12 months	10	5	5	5.30
1-20 years	57	35	22	29.08

20-40 years	64	39	25	32.47
40-60 years	37	25	12	18.87
>60 years	28	15	13	14.28
TOTAL	196	119	77	100

Antibiotic sensitivity was done using Kirby bauer disk diffusion method as per CLSI guidelines maximum sensitivity was seen for Imipenem 57%, Amikacin 38% and Piperacillin tazobactam 35%, Nitrofurantoin (for urine sample) 24%. Highest resistance was noted for Ampicillin 96.5%, Quinolones 91.33%, Cephalosporins 91.33% as shown in table-3

**TABLE-3 Antibiotic susceptibility pattern of E.coli isolates**

ANTIBIOTIC DISC	Total no. of isolates sensitive	PERCENTAGE (%)	Total no. of isolates resistant	Percentage (%)
Amikacin 30µg	75	38	121	62
Imipenem 10µg	113	57	112	43
Ampicillin 10µg	07	3.5	189	96.5
Ciprofloxacin 5µg	17	8.67	179	91.33
Cefotaxime 30µg	17	8.87	179	91.33
Nitrofurantoin (for urine sample only) (n=59)300µg	14	24	45	76
Piperacillin-tazobactam 100/10µg	69	35	127	65

## DISCUSSION

E.coli is one of the most common causes of UTI and other opportunistic infections seen in humans<sup>11</sup>. In the present study Majority of E.coli isolates were from pus and wound swab 74 (37.75%) followed by urine sample 59 (30.10%), stool 36 (18.36%), blood 15 (7.65%), vaginal swab 6 (3.06%), sputum 2 (1.02%), ascitic fluid 1(0.51%), peritoneal fluid 1 (0.51%), pleural fluid 1 (0.51%), tracheal secretion 1 (0.51%) as shown in table-1. In study done by Chika et al<sup>12</sup> maximum isolates of E.coli were from urine sample followed by pus sample, this may be attributed to the fact that more samples received from surgery department in our hospital shows growth as compared to urine sample, were culture positivity rate is about 20% in our institution. E.coli is normal commensal of gut but can cause diarrhea, all stool samples taken were clinically suspected cases of diarrhea, with pure culture obtained on repeated isolation so they were considered to be pathogenic.

In the present study infection caused by E.coli was more common among males 119 (60.71%) as compared to females 77(39.28%). Age group most commonly involved was from 20- 40 years of age followed by 1-20 years of age, then 40-60 years of age. Least number of cases were reported in age group of 1 month to 12 months in both male and females as shown in table-2. Study done by Malhotra et al<sup>13</sup> showed equal preponderance among both genders for infections caused by E.coli however our study shows contrasting results. Males are more commonly affected in our study which may be due to the fact that males have to move to different places for work so they come in contact of infections more frequently than females. Most common age group with infections caused by E.coli are from age group 20-40 years followed by 1-20 years this can be attributed to the fact that this age group is more active and mainly concerned with work and earnings of the family as ours is a tertiary care hospital which mostly caters rural population even today in villages in proportion of male to female, males are the more commonly responsible for earning and livelihood which are usually in the age group of 20-40 years followed by 15-20 years age group. In the present study maximum sensitivity was seen for Imipenem

57%, Amikacin 38% and Piperacillin-tazobactam 35%, Nitrofurantoin 24%. Highest resistance was noted for Ampicillin 96.5%, Quinolones 91.33%, Cephalosporins 91.33% as shown in table-3. Various studies have shown variation in antibiotic resistance pattern which may be due to the population under study, geographical conditions, availability of over the counter drugs and socio economic status of population and awareness in community about misuse of antibiotics and its consequences.

## CONCLUSION

Present study shows rise of MDR strains and XDR strains. It is therefore essential to prevent injudicious use of antibiotics, adhere strictly to hospital infection control policies, follow bundling protocols to prevent infection spread, regular hospital infection control rounds should be taken and reported to the concerned authority, increase awareness among patients as well as health care workers on the importance of hand washing which plays major role in prevention of spread of infections. This study will help in formulation of hospital based antibiotic policy and strengthen antibiotic stewardship practices in our hospital.

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