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Drug Susceptibility Pattern of Extraintestinal Pathogenic *E.Coli* Isolated from Various Clinical Specimens

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Abstract:

Background; *Escherichia coli cause extraintestinal infections in both community and hospitalized patients. The prevalence of multidrug-resistant extraintestinal pathogenic E.coli has increased progressively over the past few years.*

***Aim** of this study is to determine the drug susceptibility pattern of Extraintestinal Pathogenic E.coli (EXPEC) isolated from various clinical isolates in the hospital.*

Methods; *Various clinical samples processed by standard bacteriological procedures, E.coli isolated were included for the study. Antibiotic susceptibility testing was done by Kirby-Bauer disk diffusion method as per CLSI guidelines using ampicillin, ceftazidime, cefuroxime, cefotaxime, ciprofloxacin, norfloxacin, cotrimoxazole. gentamicin, Netilmycin and Nitrofurantoin for urinary isolates.*

Results; *The isolates were highest among age group of >45 years with 45(45%), followed by 15-45 years 36(36%) and 0-15 years 19 (19%). Among the specimens Urinary isolates were 47(47.0%), exudate 30(30.0%), sputum19 (19%) and Blood 4 (4.0%). Nitrofurantoin was found to be the most sensitive among urinary isolates with susceptibility rate of 77%. Netilmycin showed highest susceptibility among isolates from all samples, blood isolates 100%, sputum 89%, urinary 60% and exudate 50% were sensitive . Gentamicin susceptibility among blood were 75%, exudate 72% and sputum was 32%. Ciprofloxacin showed highest susceptibility among Blood (50%) followed by urine (47%),. cotrimoxazole showed highest susceptibility among blood (50%). All the isolates were resistant to ampicillin and 3rd generation cephalosporins.*

Conclusion; *There was high antimicrobial resistant rate in extraintestinal E. coli infection with 3rd gen cephalsporins, the results of this study highlights the importance of regular surveillance of susceptibility of E.coli.*

Keywords: *E. coli; EXPEC; CLSI*

1. INTRODUCTION

E. coli one of the important commensal flora of intestine can cause infection of extra intestinal sites.[1] The incidence of extra intestinal infection is on the rise in recent years probably due to various virulence factor and acquiring drug resistance. Production of enterotoxins, haemolysins, colicins, haemagglutinins, proteases, colonization factors, cell surface hydrophobicity, *etc*. are some of the virulence-associated factors of *E.* coli.[2] and production of ESBL contributes for drug resistance. *E. coli* strains that induce extraintestinal diseases are termed as extraintestinal pathogenic *E. coli* (ExPEC).[3] Pathogenic isolates of *E.coli* have relatively high potentials for developing resistance.[4] The treatment of *E. coli* infections is increasingly becoming difficult due to development of resistance against antibiotics.[5] Therefore, it is necessary to know the antibiotic susceptibility pattern of pathogenic *E. coli* to select the correct antibiotic(s) for the proper treatment of the infections which are caused by it.[6]

Aims and Objective

The objective of the present study was to demonstrate the spectrum of the infections which were caused by ExPEC and its drug resistance pattern.

2. MATERIAL AND METHODS

All the clinical samples (Urine, Exudate, sputum, Blood) received at Department of Microbiology, are processed as per standard microbiological procedure a total of 100 *E. coli* isolated were included.

Inclusion Criteria

E. coli isolated from all the specimen were included in the study.

Exclusion Criteria

Isolates other than *E. coli* were excluded from the study.

3. METHODOLOGY

All the samples were processed as per standard protocol a total of 100 isolates of *E. coli* identified from extraintestinal infections were included in the study. The specimens which were received by the Department of Microbiology (between Jan 2014 to Dec 2014) were urine, pus, blood, sputum.. Antibiotic susceptibility testing was done by Kirby-Bauer disk diffusion method as per CLSI guidelines using ampicillin (A), ceftazidime (CA), cefuroxime (CU), cefotaxime (CE), ciprofloxacin (CF), norfloxacin (NX), cotrimoxazole (CO), gentamicin (G), Netilmycin (NE) and Nitrofurantoin (NIT) for urinary isolates. All tests were performed on Mueller-Hinton agar and incubated at 37ºC for 24 hrs. *E.coli* ATCC 25922 was used as a standard control strain.

4. RESULTS

Urine had the highest occurrence rate with 47(47.0%), followed by exudate 30(30.0%), Next is sputum with 19(19%) and the least was Blood 4(4.0%) **(Fig-1)**

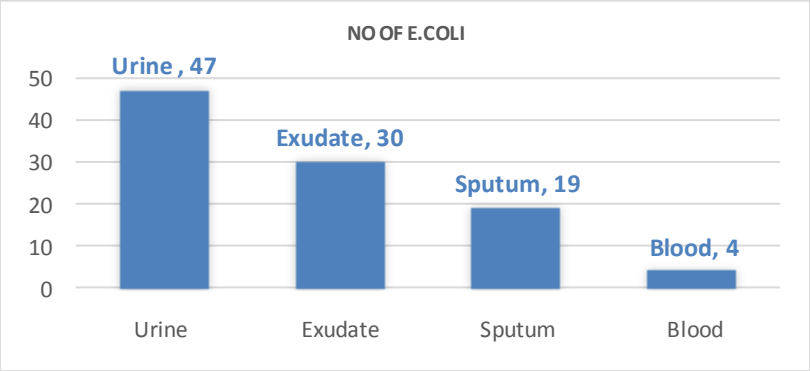

Fig1. *Distribution of E. coli Isolates among Clinical Specimens*

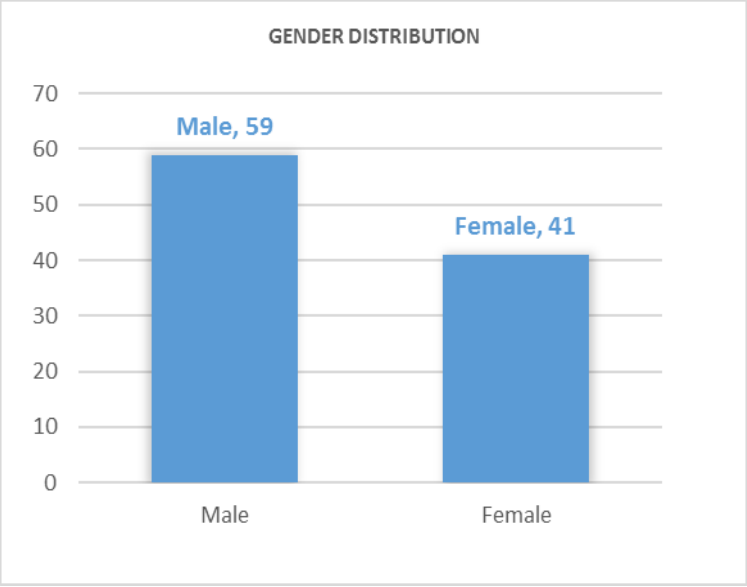

Fig2. *Gender Distribution*

Table1. *Gender Distribution among Clinical Isolates*

Specimen	Male	Female
Urine	26	21
Exudate	18	12
Sputum	13	6
Blood	4	0

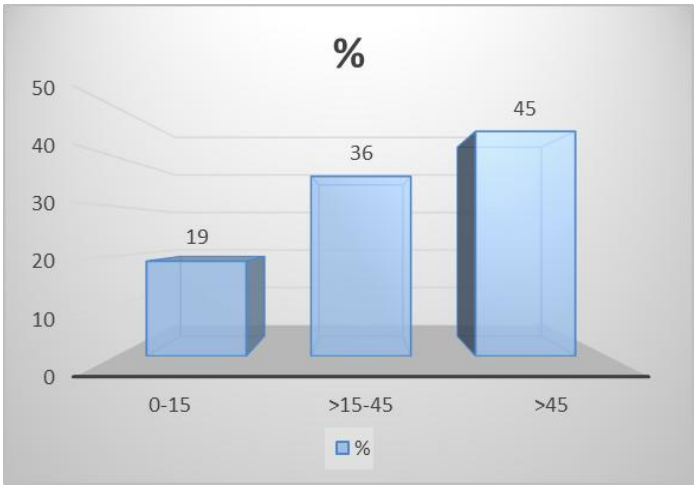

Fig3. *Age Wise Distribution*

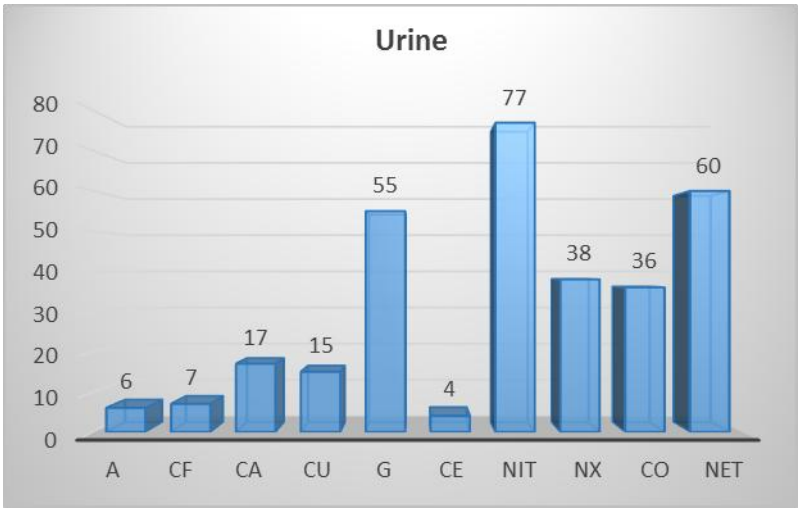

Fig4. *Sensitivity Pattern among Urinary Isolates*

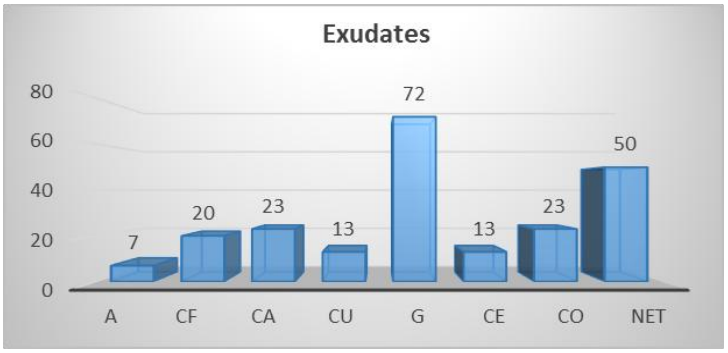

Fig5. *Sensitivity among Exudate Isolates*

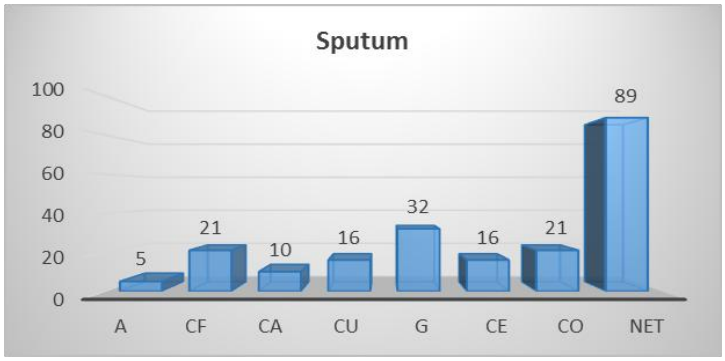

Fig6. *Sensitivity Pattern among Sputum Isolates*

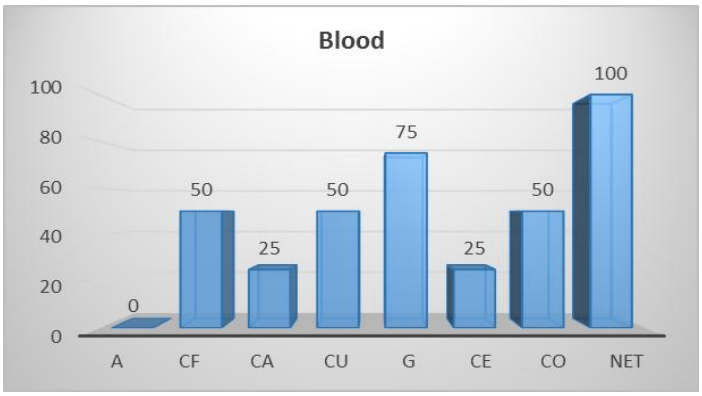

Fig7. *Sensitivity Pattern among Blood Isolates*

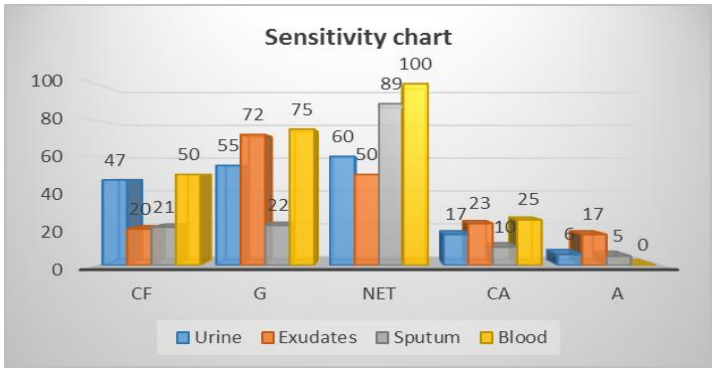

Fig8. *Sensitivity Pattern among Isolates from All Specimens*

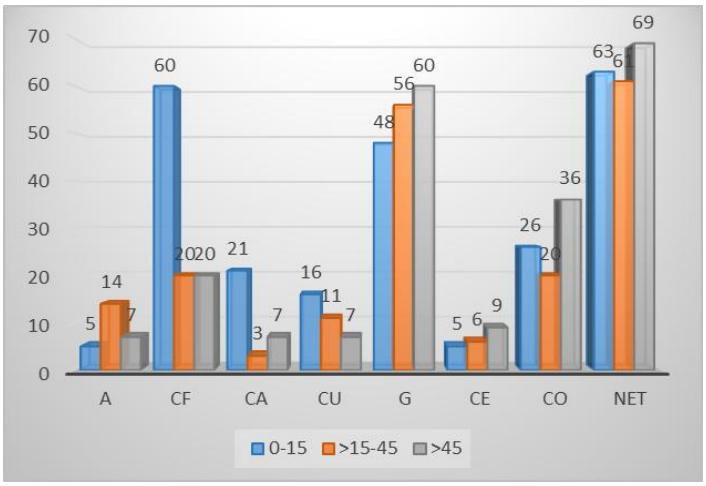

Fig9. *Sensitivity among Different Age Groups*

A;Ampicillin, CF;Ciprofloxacin, CA;Ceftazidime; CU;Cefuroxime, G;Gentamicin, CE;Cefotaxime, CO;Cotrimoxazole, NET;Netilmycin

5. DISCUSSION

Extraintestinal infections caused by *Escherichia coli* are responsible for several million episodes of urinary tract infection (UTI), an estimated 36,000 deaths from sepsis, and billions of dollars in increased health-care costs annually in the United States.[7] *Extraintestinal, pathogenic Escherichia coli* (ExPEC) possesses virulence traits that allow it to invade, colonize, and induce diseases in bodily sites outside of the gastrointestinal tract, [8] by overcoming the host defence mechanisms. *E. coli* is therefore able to cause a variety of infections such as urinary tract infections (UTIs), soft tissue infections, bacteraemias, respiratory tract infections. The treatment of *E. coli* infections is increasingly becoming difficult due to development of resistance against antibiotics.[5]

In this study a total of 100 *E. coli* isolates from all clinical samples were subjected to antibiotic susceptibility testing with different groups of antibiotics.

In this study antibiotic susceptibility pattern of all isolates showed resistance to commonly used antibiotics ampicillin, ciprofloxacin, cefotaxime, ceftazidime which was similar to other studies.[9,10] **(Fig-8)**

UTI continue to be the commonest nosocomial infection according for approximately 40% of all hospital acquired infection.[11] *E.coli* is the most prevalent pathogen contributing to these infection,[12] but resistance is seen nearly 70-80% of the strains to the commonly used antibiotics In this study urinary tract infections was highest (47%). This was similar to the findings in a study done by Olowe et al.[8] **(Fig-1)**

Majority of *E. coli* were isolated from the age group 15-45yrs this is in correlation with the study conducted by Motayo B. O. et al.[13] **(Fig-3)** In age groups, majority of drug resistant *E. coli* was seen in the in 15-45yrs. This was similar to other studies done by Iqbal *et al* and Aypak *et al*.[14,15] **(Fig-9)**

Urinary isolates showed more than 80% resistance to commonly used antibiotics ampicillin, ciprofloxacin, ceftazidime. Nitrofurantoin was found to be the most effective in UTI. Since nitrofurantoin has a single indication i.e acute cystitis, narrow tissue distribution, negligible serum concentration, bactericidal activity against *E.coli* in urine at therapeutic doses.[16] In this study nitrofurantoin showed 77% sensitivity.**(Fig-4)**

Among 0-15 yrs ciprofloxacin susceptibility (60%) is comparable to study done by Dr Bhargav N Patel *et al*.[1] **(Fig-9)**

In this study netilmycin was highly sensitive (87%) and ampicillin was highly resisitant (98%) is comparable to study conducted by Asima Banu et al,.[17] Motayo *et al* reported high resistance to 3rd generation cephalosporins and Ampicillin which is comparable to our study. **(Fig-8)**

There was high rate of resistance to third generation cephalosporins and ampicillin, Aminoglycosides and fluoroquinolones showed least resistance.

6. CONCLUSION

ExPEC isolated showed more susceptibility to Aminoglycosides than other group of drugs. In case of UTI nitrofurantoin can be used whereas other serious infections aminoglycosides can be used as empirical drugs. However it is better to get the antimicrobial susceptibility done in *E.coli* as these organisms known to exhibit drug resistance.

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