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PREVALENCE AND ANTIBIOGRAM OF ESCHERICHIA COLI ISOLATED FROM URINARY TRACT INFECTIONS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

One of the most common bacterial infections seen in clinical practice particularly in developing countries are the Urinary tract infection (UTIs). Most common organism responsible for UTI is E.coli. Despite the wide availability of antimicrobial therapy, UTI still remains a major health hazard. This was a retrospective study conducted in a tertiary care hospital to know the prevalence and antibiogram of E. coli. Samples received include mid-stream clean catch urine, suprapubic aspirate and from Foley's catheter. All the plates were inspected for growth and the isolates were identified by observing colony morphology, Gram-stain characteristics and relevant biochemical tests. The isolates were tested for their antimicrobial susceptibility and the results were interpreted by modified Kirby Bauer disc diffusion method, according to the guidelines of Clinical and Laboratory Standards Institute. Out of 704 samples tested, 438 (62.21%) were positive for E.coli. E.coli was highly resistant to Ampicillin (91.7%) followed by Ofloxacin (66.6%) and least resistance was seen with Imipenem (2.73%) followed by Piperacillin-tazobactam (21.6%) and Amikacin (21.9%). Knowledge of prevalence and antimicrobial susceptibility pattern of E. coli will help in selecting an appropriate antibiotic for empirical therapy. Formulation of hospital infection control committee and strict adherence to the guidelines of the committee will help in preventing the emergence of drug resistance.

Key words: Urinary tract infection, Escherichia coli, antimicrobial susceptibility, bacteriuria.

INTRODUCTION

One of the commonest bacterial infections are the Urinary tract infections (UTIs), and the most common organism accounted for UTI is Escherichia coli (E.coli).[1, 2] Despite the widespread availability of antibiotics, UTI is one of the most important causes of morbidity in general population and also the common cause of nosocomial infection among hospitalized patients.[3] Treatment of UTIs can be difficult because of recurrences and asymptomatic infections. The susceptibility pattern of uropathogens have been changing over the past years, both in community and nosocomial infections.[4,5]

Antibiotics are invariably used for the treatment of UTIs, though resistance to antibiotics has been reported all over the world, particularly in developing countries.[6] Treatment of UTIs is a challenge due to the increasing level of antimicrobial resistance.[7] There is an increased emergence of antimicrobial resistance in the uropathogens, probably due to the empirical administration of anti bacterial therapy, even before the availability of the urine culture results, is a matter of concern worldwide.[8] The prevalence of antimicrobial resistance in patients with UTI is increasing and can vary according to geographical and regional location.[9]

For treatment of UTIs and prevention of antimicrobial resistance, knowledge of the common organisms responsible for UTIs and their antibiotic susceptibility patterns in specific geographical locations will help physicians in choosing an appropriate empirical treatment. There are only few studies of prevalence of UTI and antibiogram of E.coli in this part, hence the present study was undertaken to find out the prevalence and antibiogram of UTI due to E.coli

MATERIAL AND METHODS

This was a retrospective study conducted in a tertiary care hospital in South India. Data was collected from March 2010 to March 2011 using the microbiological records of consecutive urine samples received in the laboratory during the study. All positive samples reports from both community acquired and nosocomial UTI was included from various specialities.

Urine samples were cultured using a 0.01 ml calibrated loop onto blood agar and MacConkey agar plates, incubated at 37°C for 18-24 hours and the number of colonies was counted. All specimens were inoculated on cystine lactose electrolyte-deficient medium, (Hi Media,

Mumbai) by semi quantitative method. The specimen yielding more than or equal to 10^5 organisms/ml of urine was interpreted as significant. Samples received include mid-stream clean catch urine, suprapubic aspirate and from Foley's catheter. All the plates were inspected for growth and the isolates were identified by observing colony morphology, Gram-stain characteristics and relevant biochemical tests.[10]

The isolates were tested for their antimicrobial susceptibility and the results were interpreted by modified Kirby Bauer disc diffusion method, according to the guidelines of Clinical and Laboratory Standards Institute.[11] The antibiotics tested were Ampicillin (10 µg), Gentamicin (10µg), Co-trimoxazole (1.25/23.75 µg), Ofloxacin (10 µg), Nalidixic acid (30 µg), Piperacillin-tazobactam (100µg/10 µg), Ceftriaxone (30 µg), Ceftazidime (30 µg), Amikacin (30 µg), Nitrofurantoin (300 µg), Imipenem (10 µg) (Hi Media, Mumbai, India). ATCC E. coli 25922 was inoculated was used as control strain.

RESULTS

The total specimens were 704, out of which 438 (62.21%) were positive for E. coli. The age and sex distribution of E. coli is shown in table 1.

Table 1: Age and sex distribution of E. coli from isolated cases

Age group (years)	Male	Female	Total
0-10	9	15	24
10-20	9	6	15
20-50	105	141	246
>50	45	108	153
Total	168	270	438

Highest number of cases were in the age group of 20-50 years, and maximum cases were from females

The distribution of E. coli from different specialities is shown in table 2.

Table 2: Distribution of E. coli from different specialities

Specialty	Number	Percentage
General medicine	146	33.3
Gynaecology	95	21.6
General surgery	54	12.3
Pediatric	24	5.4
Urology	119	27.1

Maximum cases were from General medicine and urology departments.

The antibiogram of E. coli is shown in table 3

Table 3: Antibiotic Resistance Pattern of E. coli.

Antibiotic	Number	Percentage
Ampicillin	402	91.7
Gentamicin	246	56.1
Co-trimoxazole	234	53.4
Ofloxacin	292	66.6
Nalidixic acid	252	57.5
Piperacillin-tazobactam	95	21.6
Ceftriaxone	248	56.6
Ceftazidime	240	54.7
Amikacin	96	21.9
Nitrofurantoin	138	31.5
Imipenem	12	2.73

Highest resistance was seen with Ampicillin and least resistance to Imipenem.

DISCUSSION

Knowledge on local prevalence and antimicrobial resistance trends among urinary isolates is important in guiding clinicians appropriate for appropriate empirical treatment of UTI. E. coli is the most prevalent pathogen contributing to these infection, but resistance is seen nearly 70-80% of the strains to the commonly used antibiotics.[12] In the present study E. coli accounted for 62.21% of all the positive cases. This is in accordance with the recent studies where the predominant organism isolated was E. coli.[13-15]

In the present study highest resistance was seen with Ampicillin (91.7%), followed by Ofloxacin (66.6%) and least resistance to Imipenem (2.73%). This is in accordance with other studies where a high percentage of E. coli isolates were resistant to Ampicillin and Ofloxacin.[14-16] Fluoroquinolones are considered highly effective in treatment of UTI because of concentrating ability in urine and high renal clearance.[17] However due to wide spread use of Fluoroquinolones, there have been reports of evolving bacterial resistance to Fluoroquinolones.[18-19]

E.coli showed varied resistance among Aminoglycosides (56% to Gentamicin and 21.9% to Amikacin) The finding differs from the other study where resistance to Gentamicin and Amikacin was high,[19] but another study showed 40% resistance to Gentamicin and resistance to Amikacin was only 9%.[20] Resistance to Ceftriaxone was 56.6%, Ceftazidime

was 54.7%a and to Piperacillin-tazobactam was 21.6%. The findings are similar with the other studies.[21-23] Tazobactam in combination with piperacillin has an excellent clinical efficacy in various infections.[24] Tazobactam seems to be the most promising beta lactamase inhibitor, which has unlike clavulanic acid and sulbactam, its own antibiotic activity.[25] Resistance to Nitrofurantoin was 31.5%. In some studies Nitrofurantoin was found to be the most effective drug for UTI.[26-28] Antimicrobial resistance pattern varies with time which might increase or decrease.[29] Antibiotic susceptibility studies will help in early detection of development of antibiotic resistance and preserve powerful antibiotics like Imipenem for the treatment of life threatening infections.

Limitations of the study

This was a retrospective study and sample size was small. Future studies should be prospective with large sample size.

CONCLUSION

In the present study, E. coli showed resistance to commonly used antibiotics. Antimicrobial susceptibility patterns vary with time and region. Prevalence and antibiotic susceptibility studies need to be conducted regularly, which will help in developing guidelines for treatment of UTI. The present study emphasizes the need for constant monitoring of susceptibility of uropathogens in different regions in order to rationalize the antibiotic use.

Conflict of interest: None

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