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ANTIBIOTIC RESISTANCE PATTERN OF UROPATHOGENS IN UTI

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ABSTRACT

Urinary tract infections (UTI) are one of the most common infectious diseases diagnosed in outpatients as well as in hospitalized patients, and can lead to significant mortality. UTI account for a large proportion of antibacterial drug consumption and have large socio-economic impacts. UTIs refer to the presence of microbial pathogens within the urinary tract and it is usually classified by the infection site:- bladder (cystitis), kidney (pyelonephritis), or urine (bacteriuria) and also can be asymptomatic or symptomatic, UTIs that occur in a normal genitourinary tract with no prior instrumentation are considered as "uncomplicated," whereas "complicated" infections are diagnosed in genitourinary tracts that have structural or functional abnormalities, including instrumentation such as indwelling urethral catheters, and are frequently asymptomatic. Urinary tract infection (UTI) is one of the most common infections affecting different age group of the patients. The international studies have shown that UTIs in women are very common; therefore, one in five adult women experience UTI in her life and it is extremely common, clinically apparent, worldwide patient problem. More than 95% of urinary tract infections are caused by a single bacterial species. *E. coli* is the most frequent infecting organism in acute infection *Klebsiella, Staphylococci, Enterobacter, Proteus, Pseudomonas,* and *Enterococci species* are more often isolated from inpatients. The relative frequency of the pathogens varies depending upon age, sex, catheterization, and hospitalization. The most frequent uropathogens were Gram negatives of all the isolates. *E. coli* was the most common bacteria isolated from urine samples in both outpatients and inpatients of both sexes.

KEYWORDS: E. coli, *Urinary tract infections, uropathogens, Nitrofurantoin.*

INTRODUCTION

Urinary tract infections (UTIs) can be divided into upper tract infections, which involve the kidneys (pyelonephritis), and lower tract infections, which involve the bladder (cystitis), urethra (urethritis), and prostate (prostatitis. Moreover, infection often spreads from one area to the other. Although urethritis and prostatitis are infections that involve the urinary tract, the term UTI usually refers to pyelonephritis and cystitis. Most cystitis and pyelonephritis are caused by bacteria. The most common nonbacterial pathogens are fungi (usually candidal species), and, less commonly, mycobacteria, viruses, and parasites. Nonbacterial pathogens usually affect patients who are immunocompromised; have diabetes, obstruction, or structural urinary tract abnormalities; or have had recent urinary tract instrumentation. Other than adenoviruses (implicated in hemorrhagic cystitis), viruses have no major contribution to UTI in immunocompetent patients. Urethritis is usually caused by an STD. Prostatitis is usually caused by a bacterium and is sometimes caused by an STD. Every woman has a 60% lifetime risk of developing bacterial cystitis, which develops mostly before the age of 24. By contrast, men have a lifetime risk of only 13%**.** In children approximately 5% of girls and 1% of boys have a UTI by 11 years of age. UTI is said to exist when pathogenic organisms are detected in the urine, urethra, bladder, kidney or prostate. In most instances, growth of more than 105 organisms per milliliter from a proper collected midstream clean-catch urine sample indicates infection. The vast majority of uncomplicated UTIs are caused by the Gram-negative bacillus Escherichia coli, with other pathogens including *Enterococci, Staphylococcus saprophyticus, Klebsiella spp. and Proteus mirabilis***.** Treatment of UTIs cases is often started empirically and therapy is based on information determined from the antimicrobial resistance pattern of the urinary pathogens. However, a large proportion of uncontrolled antibiotic usage has contributed to the emergence of resistant bacterial infections. As a result, the prevalence of antimicrobial resistance among urinary pathogens has been increasing worldwide. Associated resistance, i.e. the fact that a bacterium resistant to one antibiotic is often much more likely to be resistant to other antibiotics, drastically decreases our chances of getting a second empirical attempt right. Resistance rates to the most common prescribed drugs used in the treatment of UTIs vary considerably in different areas world-wide. The estimation of local etiology and susceptibility profile could support the most effective empirical treatment. Therefore, investigating epidemiology of UTIs (prevalence, risk factors, bacterial isolates and antibiotic sensitivity). This study was designed to evaluate the drug resistance patterns to some of the commonly used antimicrobials in UTI like the beta lactams, fluroquionolones and aminoglycosides.

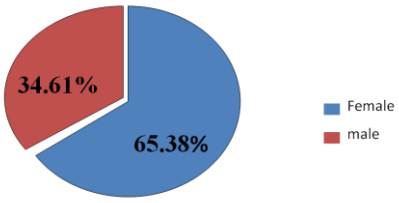
METHODS

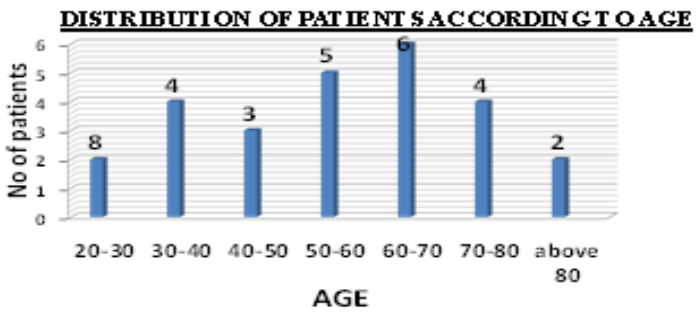
This was a hospital based study done in 26 patients in the Department of General medicine at Fortis Hospital which is a 250 bedded hospital located at bannerghatta, hospital. The study was prospective study, done using case records for a period of two months. The data from case records of the patients who admitted with diagnosis of UTI during the study period were included for the study based on inclusion and exclusion criteria.

The data from the case records of adult patients above the age of 20 years, of both sexes, diagnosed with UTI were included for the study. Patients with asymptomatic bacteriuria, those with complicated UTI, upper UTI or known malformations, paediatric and pregnant patients, immunocompromised patients like patients with HIV, on corticosteroids or immunosuppressant therapy, organ transplant recipient were excluded. The culture is done by CLSI guidelines and *in vitro* sensitivity testing report data were collected in addition to demographic data, co morbid conditions, symptoms and duration of symptoms and drug therapies.

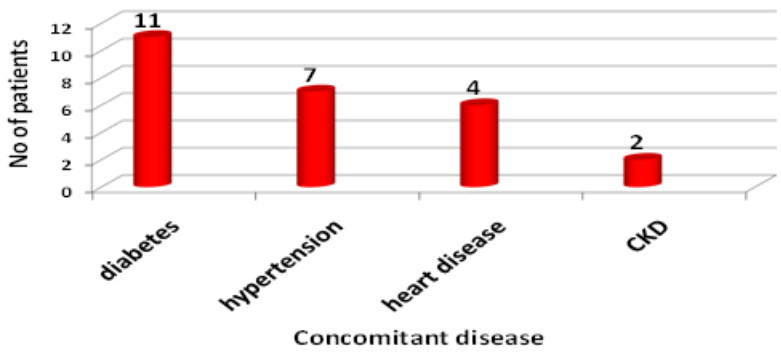
RESULTS AND DISCUSSION

On the basis of inclusion and exclusion criteria, 26 patients were selected from the general ward over a period of two months for the present study. Among 26 patients were Male and female showed in (fig 1).





Most of the patients were under the age group of 30 - 80 years showed in (fig2).



From total patients 11 of having Diabetes mellitus, 7 of having hypertension,4 having heart disease and 2 is having CKD Fig 3.

From this study, *E.coli*, *K. pneumoniae* and *Enterococcus and pseudomonas*. were the primary isolates found to cause UTI (Figure 4).Additionally, ESBL positive species within *E.coli* and *klebsiella pneumonia* constituted respectively. The high percent of those ESBL producing uropathogense specially *E. coli* and *K. pneumoniae* have also been reported in previous similar studies (review of literatures and references).

Table 1: Distribution of uropathogens and their sensitivity antimicrobials.

Esbl *Ecoli*	***Ecoli***	**Amp c *Ecoli***	***Klebsiella pneumonia***	***Enterococcus***	***Pseudomonas***
Nitrofurantoin	Nitrofurantoin	Gentamycin	Gentamycin	Nitrofurantoin	Nitrofurantoin
Gentamycin	Gentamycin	Tetracyclin	Piperacillin/ tazobactam	Vancomycin	Gentamycin
Amikacin	Amikacin	Amikacin	Amikacin	Linezoliod	Cefaperazone/ Sulbactam
Piperacilin/taz obactam	Piperacilin/taz obactam	Tobramycin	Tobramycin	Tigecycline	Amikacin
Tobramycin	Tobramycin	Ertapenem	Imipenem		Piperacilin/taz obactam
Imipenem	Imipenem		Meropenem		Tobramycin
Meropenem	Meropenem				Imipenem
Ertapenem	Ertapenem				Meropenem

ESBL pathogens are often known to be multidrug resistant. Results showed ESBLs were highly resistant (over 30%) to Cotrimoxazole, Cefuroxime, Norfloxacin, Ciprofloxacin, Amoxicillin/clavunic acid, Tetracycline, Ofloaxacin, Piperacilin/Ticarcillin, Cefipime, Aztrenom, Ceftriaxone, Ceftazidine, Cefotaxime, Levofloxacin, Cefoperazone, Cefoxitin. These data shows that ESBLs are multidrug resistant and pose challenges to clinicians in determining which drugs to use to effectively treat UTI. The emergence of ESBL-producing uropathogens demonstrates the remarkable ability of bacteria to evolve and survive in the

world of antibiotics., The need to perform specialised laboratory tests for detection, and treatment with more expensive antibiotic agents will be necessary in some cases. Nitrofurantoin showed strong activity against of all isolated organisms and was very active E.coli and Enterococcus However it has a very weak activity against Proteus spp and Pseudomonas spp, it can be seen that sensitive more than 98% of the isolates are sensitive to third line agents like Imipenem Meropenem, Tobramycin, linezolid, tigecycline, Ertapenem, and are sensitive to second line like amikacin, piperacillin/tazobactam, cefoperazone/sulbactam and then to nitrofurantoin, gentamycin.

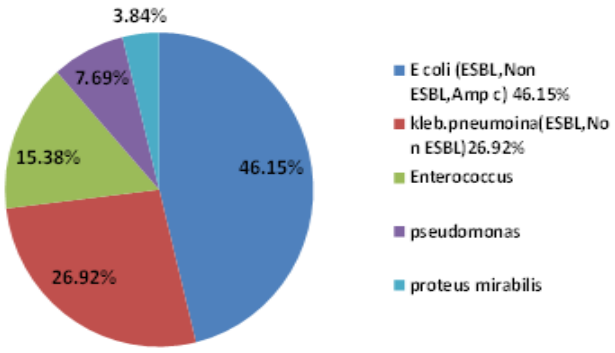


Figure 4: The pie chart showing organisms isolated.

CONCLUSION

Culture positive rate for uropathogens was high, with the Majority coming from female patients. *E.coli* was the most common etiological agent and remains susceptible to nitrofurantoin and third line agents. Nitrofurantoin should be the ideal antibiotic to use for uncomplicated UTI. My findings suggest the presence of ESBL-producing strains are in *E coli and klebsiella* pneumonia species and MDR *Klebsiella* pneumonia are going to higher rate so, monitoring of antibiotic susceptibility of bacterial isolates should be mandatory to manage the upcoming problems of ESBL producing *E.coli, klebsiella pneumonia.*

REFERENCES

1. Gales AC, Sader HS, Jones RN. The SENTRY Participants Group(Latin America). Urinary tract infection trends in Latin Americanhospitals: Report from the SENTRY antimicrobial surveillanceprogram (1997-2000). Diagn Microbiol Infect Dis, 2002; 44: 289–99.

2. Karlowsky JA, Kelly LJ, Thornsberry C, Jones ME, Sahm D. Trends in antimicrobial resistance among urinary tract infection isolates of *Escherichia coli* from female outpatients in the United States. Antimicrob Agents Chemother, 2002; 46: 2540–5.
3. De Backer D, Christiaens T, Heytens S, de Sutter A, Stobberingh EE, Verschraegen G. Evolution of bacterial susceptibility pattern of *Escherichia coli* in uncomplicated urinary tract infections in a country with high antibiotic consumption: A comparison of two surveys with a 10 year interval. J Antimicrob Chemother, 2008; 62: 364–8.
4. Rock W, Colodner R, Chazan B, Elias M, Raz R. Ten years surveillance of antimicrobial susceptibility of community acquired *Escherichia coli* and other uropathogens in Northern Israel.(1995-2005) Israel Med Assoc J, 2007; 9: 803–5
5. Vasquez Y, Hand WL. Antibiotic susceptibility patterns of community acquired urinary tract infection isolates from female patients on the US (Texas)-Mexico Border. J Appl Res, 2004; 4: 321–6.
6. Griebling TL. Urinary tract infection in men. In: Litwin MS, Saigal CS, editors. Urologic Diseases in America. DHHS, PHS, NIH, NIDDK. Washington, DC: GPO; NIH publication, 07-5512., 2007; 621–45.
7. Stamm WE, schaeffer AJ. The state of the Art in the management of Urinary tract infections, Am J Med, 2002; (supp 1A): 113.
8. Blondeau JM. Current issues in the management of urinary tract infections; extended-release ciprofloxacin as a novel treatment option. Drugs, 2004; 54(6): 61128.
9. Goldstein FW. Antibiotic susceptibility of bacterial strains isolated from patients with community acquired urinary tract infections in France. Multicentre Study Group. Eur J Clin Microbial Infect Dis, 2000; 19: 112-7.
10. Ashkenazi S, Eventov S, Samra Z, et al. Uropathogens of various populations and their antibiotic susceptibility. Pediatr Infect Dis J, 1991; 10: 742-6.
11. National Committee for Clinical Laboratory Standards: Methods for Disk Susceptibility Tests for Bacteria That Grow Aerobically. NCCLS Document M2-A7. Wayne, National Committee for Clinical Laboratory Standards 7th edition., 2000.
12. Akram M, Shahid M, Khan AU. Etiology and antibiotic resistance patterns of community acquired urinary tract infections in JNMC Hospital, Aligarh, India. Ann Clin Microbiol Antimicrob, 2007; 6: 6.
13. Samiah HsAl mijalli, bacterial uropathogens in UTI and antibiotic susceptibility pattern in Riayadh Hospital, Saudi Arabia, April 29, 2017.