

Bacterial Aetiology and Antibiotic Sensitivity of community acquired Urinary Tract Infections (UTI) experience of a university unit in Sri Lanka

**Part -1 (Medical Science)
Chapter-V
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Abstract:

Community acquired urinary tract infection is a common condition in surgical, medical and pediatric wards and outpatient departments. The objective of this study was to find out the Aetiological agents responsible and the sensitivity patterns of community acquired UTI. The study was conducted with 206 subjects over one year period by inoculating urine onto quality controlled CLED medium. And sensitivity was tested by Extended Spectrum Beta-Lactamase (ESBL) testing according to the Clinical and Laboratory Standard Institute (CLSI) 2013 guideline. A total of 206 urine samples were analyzed, of which 34 yielded a significant growth. Coliforms accounted for 88% (n=30) of the total isolates. The rest was equally distributed among the following groups; Staphylococcus Saprophyticus, Staphylococcus Aureus, Streptococcus spp. and other coagulase negative Staphylococci [Each 3%, (n=1)]. Nitrofurantoin had the best in vitro sensitivity against coliforms (93.3%, n=28). Out of commonly used urinary Antiseptics while Norfloxacin and Nalidixic acid had sensitivity of 43% and 40% respectively. Out of coliforms 30% (n=9) were conformed as ESBL producers by double disc diffusion method. Therefore due to high bacterial resistance to commonly used antibiotics in empirical management, alternatives such as Nitrofurantoin and Coamoxyclav should be considered in the management of community acquired UTI.

Index Items - Clinical and Laboratory Standard Institute (CLSI), CLED medium, Extended Spectrum Beta - Lactamase , Col Streptococcus spp , Staphylococcus spp.

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INTRODUCTION

Urine is the single most commonly received specimen in routine microbiology laboratories with many thousands of antimicrobial sensitivity being issued each day. Community acquired urinary tract infections (UTIs) are the most common bacterial infections among women. (Barrett et.al., 1999) Community acquired urinary tract infection is a common condition uncounted not only in surgical wards but also in medical, Pediatric wards and outpatient departments.

Urinary Tract Infections (UTIs) are symptomatic infections of the urinary tract, mainly caused by the bacterium

Escherichia coli. (Praider and Koche , 2002)

The resistance pattern of community acquired UTI pathogens has not been studied extensively (Goldstein, 2000). According to a study which was done by Akram et al., in 2007 to compare the frequency and drug resistance pattern in Uropathogenes isolated from patients with community acquired UTIs as well as identification of ESBL producer strains among the Uropathogenes showed growth of pathogens among which the most prevalent were *E. coli* (61%). Most of the isolates were resistant to four or more number of antibiotics. Forty two per cent of isolates were detected to produce ESBL among which 34.42 % were *E. coli* isolates. (Akram, Shahidand and Khan, 2007)

As the study which was done by Kahlmeter, G. in 2002 said that 42% of the *E. coli* isolates were resistant to one or more of the 12 Antimicrobial drugs investigated. Resistance in *E. coli* to co-amoxiclav, Mecillinam, Mefadroxil, Nitrofurantoin, Fosfomycin, gentamicin and Ciprofloxacin was <3%. (Kahlmeter, 2002)

According to the study I.M Rejitha et.al in 2014; the range of potential Uropathogenes in elderly patients is considerably broader than in the younger adult population.

The elderly patients are also more likely to have asymptomatic Bacteriuria as they get older. Antimicrobial resistance among Uropathogens is increasing. Extended Spectrum Beta Lactamase (ESBL) producing organisms are frequently resistant to many of the antimicrobial agents usually recommended for the treatment. (Rejitha, Sucilathangam and Velvizhi, 2014)

According to the above literature, *Escheichia coli* is the main causative organism in community acquired UTI. The major objective of this study was to find out the Aetiological agents responsible and the sensitivity patterns of community acquired UTI.

II. MATERIALS AND METHOD

A prospective study was conducted with 206 subjects who were suspected of having community acquired urinary tract infections at medical, surgical wards and the outpatient departments of Teaching Hospital, Peradeniya, Sri Lanka during one year period from 2013-01-08 to 2013-12-07. Patients with a history of hospitalization or urinary tract instrumentation or antibiotic use within past 3 months and urinary catheter in situ were excluded from the study. Only adult patients with clinical features suggestive of UTI were included in this study. The selected subjects were informed about the objective and the outcome of the research and informed written consent was obtained. Then mid-stream urine samples were collected to sterile wide mouthed commercially available plastic containers.

Collected urine samples were transported to the microbiology lab within one hour and 0.001 ml of urine was inoculated onto quality controlled cysteine lysine electrolyte deficient (CLED) medium by using a standard microbiological techniques. Inoculated plates were incubated at 37oc and plates were examined for a growth following overnight incubation. Pure growth of $\geq 10^5$ /ml was considered as a significant growth for this study purpose. Organisms were identified by using routine microbiological procedures and sensitivity testing. ESBL testing was carried out according to the Clinical and Laboratory Standard Institute (CLSI) 2013 guideline.

iii. Statistical Analysis And Graphical Presentation

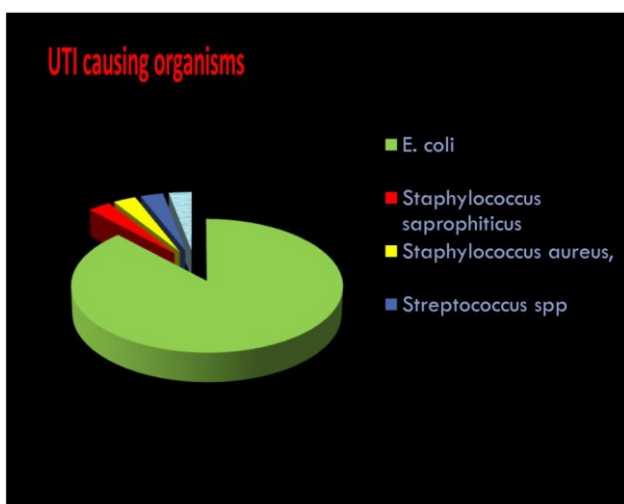


Fig. 1- UTI causing organisms

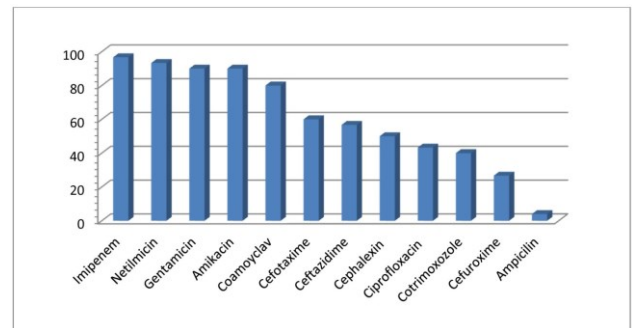


Fig 2: the percentage sensitivity of antibiotics

IV. RESULTS

A total of 206 urine samples were analyzed, of which 34 yielded a significant growth. Coliforms accounted for 88% (n=30) of the total isolates while the rest was equally distributed among the following groups; *Staphylococcus Saprothiticus*, *Staphylococcus Aureus*, *Streptococcus spp.* and other coagulase negative *Staphylococci*. [Each 3%, (n=1)]

Nitrofurantoin had the best in vitro sensitivity against coliforms (93.3%, n=28) out of commonly used urinary antiseptics while Norfloxacin and Nalidixic acid had sensitivity of 43% and 40% respectively.

Among coliforms sensitivity to Imipenem was 96.7% and the rest were as follows; Netilmicin 93.3%, Gentamicin 90%, Amikacin 90%, Coamoxyclav 80%, Cefotaxime 60%, Cefrazidime 56.7%, Cephalexin 50% Ciprofoxin 43.3%, Cotrimoxozole 40%, Cefuroxime 26.7% and only 4% to Ampicillin. Out of Coliforms 30% (n=9) were conformed as ESBL producers by double disc diffusion method.

V. DISCUSSION

This study shows the distribution and antibiotic susceptibility pattern of microbial species isolated from patients with community acquired UTIs. These organisms cause a variety of infections including UTIs. This study included the patients who were suspected of community acquired urinary tract infections at medical and surgical wards at Teaching Hospital, Peradeniya, Sri Lanka.

According to this study, Coliforms accounted for 88% (n=30) of the total isolates of which 30% were ESBL producers. The study which was done by D.J Farrell et.al in 2003 confirmed that *Escherichia coli* were the predominant pathogen in urinary tract infections. (Farrell et al., 2003)

According to a study done by Gupta et.al in 2001 found that Nitrofurantoin had the best in vitro sensitivity against coliforms (>90%) out of commonly used urinary antiseptics and also she showed that Nitrofurantoin demonstrated activity against the majority of isolates that cause UTIs that were recovered from women aged 15–50 years. (Gupta et la., 2001) One of the study other study which was done in Britain to assess the antibiotic

sensitivity of bacteria associated with community acquired urinary tract infection, 65.1% were E.coli and 23.4% were "coliforms" other

than E. coli. 86.8% were sensitive for Nitrofurantoin. 98.9% of all isolates were found to be sensitive to Norfloxacin, 95.7% to co- Amoxclav, 86.8% to Nitrofurantoin and 77.4% to cephalexin. (Barrett et.al., 1999) These results were slightly varied with our results. These differences may be due to the differences in antibiotic usage in different regions leading to varying resistant patterns among organisms.

Meharwal et.al in 2002 said that antibiotic resistance is becoming a big problem for the public health which threatens the lives of hospitalized individual as well as those with chronic conditions and adds considerably to health care cost. (Meharwal et.al., 2002) One of the important factors contributing to these high resistance rates might be high antibiotic use. (Kahlmeter, 2002)

More interestingly 30% of coliforms were confirmed as ESBL producing in this study population who had not recently exposed to any antibiotics. But the study which was done by Picozzi et.al in 2013 using 2601 outpatient and 1717 hospital urine cultures, they found out that in year 2010, ESBL – producing E. coli strains were isolated in 6.7% of cases at a local level and 20.6% in hospitals (Picozzi et.al., 2013). But in contrast the study which was done by Qiao et.al in year 2011, they analyzed 198 culture positive urine samples and 175 isolates were included in the final analysis. E coli were detected in 50% of cultures. The detection rate of ESBL producing E coli was 53%. (Qiao et.al., 2011)

VI. CONCLUSION

Due to high bacterial resistance to commonly used antibiotics in empirical management, alternatives such as Nitrofurantoin and Coamoxyclav should be considered in the management of community acquired UTI.

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