

Urinary Tract Infection Prevalence and Antibiotic Resistance A Retrospective Study in Basra Governorate, Iraq.

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Abstract:

Urinary tract infections (UTIs) is one of the most common infectious diseases, due to presence of bacteria in urine together with symptoms, and sometimes signs, of inflammation like frequent micturation, dysuria, pyuria, nocturia, fever, and haematuria, most commonly occurring in women. Antimicrobial agents are among the most frequently prescribed drugs for UTIS, in other hand the high consumption of often inappropriately prescribed antibiotics combined with crowding, multiple pathology and frequent uses of invasive devices are the major factors contributing to high level resistance.

This retrospective study was designed to evaluate the prevalence of microorganisms in UTIs and the pattern of antimicrobial utilization and their susceptibility also the risk of difference in sex on UTIs in Basra, Iraq.

The study was conducted at the urology wards in Al-Basra General Hospital, Al-Fayhaa General Hospital, Alsader Teaching Hospital and Al-Mowani General Hospital in Basra, Iraq, where the data collected after getting approval from the institutional ethical committee. Ninety patients were included and accepted. The sensitivity results from the files were further confirmed by reviewing the hospital laboratory archives.

This study showed a high prevalence of UTIs in female compared to male. Among the culture positive, patients had *E. coli* (higher percent) and remaining had *Pseudomonas Spp.*, *Proteus Spp.*, *Klebsiella Spp.*, *Staphylococcus aureus* and *Streptococcus Spp.* infections. Regarding antibiotic sensitivity pattern, the pathogens showed more sensitivity to imipenem followed by amikacin and less frequency to ciprofloxacin, nitrofurantoin and amoxiclave, while the lowest sensitivity were shown in co-trimoxazole and cefotaxime.

In conclusion *E.coli* is the most important cause of UTIs in Basra, Iraq with high prevalence ratio in females. Imipenem and amikacin are the first line drugs irrespective of the causative agent for UTIs., while cefotaxime and co-trimoxazole resistance are very high.

Key Worde: Urinary tract infections (UTIs), Antibiotics, Resistance.

دراسة إنتشار أصابات الجهاز البولي ومدى مقاومتها للمضادات الحيوية

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ن التهابات المسالك البولية هي واحدة من أهم أمراض الجرثومية التي تتميز بوجود البكتيريا في البول متزامنة
عراض الالتهاب مثل التبول الليلي
المضادات الحيوية هي من أهم الأدوية التي تستخدم لمعالجة المرض
للمضادات الحيوية واستخدام الآلات الاجتياحية هورالمقاومة البكتيرية للعلاج.
تهدف هذه تقييم والكشف عن نسب الاصابة بالمرض بين الذ والانات ونسب البكتيريا المسببة
له ونمط الاستفاده من المضادات الحيوية ومدى تأثيرها وحساسية البكتيريا لها في محافظة البصرة العراقية.

جريت الدراسة في ردهات المسالك البولية في مستشفيات محافظة البصرة (الصدر التعليمي مستشفى الفيجا)
 تسعون مريضاً وتم التحقق من الملفات في ارشيف المختبر.
 لقد بينت الدراسة بين الاناث مما هو عليه في الذن البكتريا المسببة الاكثر شيوعاً في البصرة هي مكورات الاشيريشيا يتبعها انواع اخرى.
 والاميكاسين وبدرجة قل للسبوفلوكساسين والنايتروفورانتوين والاموكسيكلاف والاستجابة ضعيفة جداً والكوتريموكسازول.

Introduction:

Urinary tract infection (UTI) is one of the most common infectious diseases and is defined as the presence of bacteria in urine together with symptoms, and sometimes signs, of inflammation characterized by frequent micturation, dysuria, pyuria, nocturia, fever, occasional suprapubic pain, and haematuria. UTI is one of the most commonly occurring bacterial infections among men and women^[1,2].

UTI is mostly caused by gram-negative aerobic bacilli found in the gastrointestinal tract known as Enterobacteriaceae. Included the *Escherichia coli* (70-95%), *Klebsiella* 1-2%, *Proteus* species 1-2%, *Enterobacter*, *Citrobacter*, and *Serratia* species. Other common pathogens include *Staphylococcus epidermidis*, *Staphylococcus saprophyticus* 5-10% and *Enterococcus* species which presumably result in UTI following colonization of the vagina or perianal skin. Less common organisms such as *Gardrenella vaginalis*, *Mycoplasma* specie and *Ureaplasma urealyticum* may infect patients with inter-mittent or indwelling catheters^[1,3].

Recurrent UTIs are usually found in women and should receive further treatment to prevent kidney damage, chronic kidney disease (CKD) may result from recurrent UTIs and retrospective infection to the kidneys^[4]. Antimicrobial agents are among the most frequently prescribed drugs for UTIS in other hand the high consumption of often in appropriately prescribed antibiotics combined with crowding, multiple pathology and frequent uses of invasive devices are the major factors contributing to high level

resistance. Choosing an antibiotic from the wide range available, can present a dilemma for prescribers and such difficulty is increased by the variations in sensitivity patterns in different population. Furthermore physicians need to know local patterns of microbial susceptibility in UTIs for proper drug selection depending on culture and sensitivity but the degree of exposure of a population to specific antibiotics could play a role in this variation^[5].

It is commonly accepted that patients with symptoms attributable to the urinary tract and who have a positive culture are most likely to benefit from antibiotics. The goals of the management of UTI are prompt diagnosis of causative bacteremia, prevention of progressive renal problems by prompt eradication of the bacterial pathogen, identification of abnormalities of the urinary tract and prevention of recurrent infections; and resolution of the acute symptoms of the infection^[6]. Prevention of recurrent UTI focuses on detection and correction if possible, of urinary tract abnormalities. Any delay in initiation of the antibacterial therapy is associated with an increased risk of renal scarring. The initial choice of antibacterial therapy is based on the knowledge of the predominant pathogens in the patient's age group, antibacterial sensitivity patterns in the practice area, the clinical status of the patient and the opportunity for close follow-up. Accordingly this retrospective study was designed to evaluate the prevalence microorganisms in UTIs and the pattern of antimicrobial utilization and their susceptibility also the risk of different sex in UTIs in Basra, Iraq.

Materials and Methods:

The study was conducted at the urology wards in the Basra General Hospital, Al-Fayhaa Hospital and Alsader Teaching Hospital and Al Mowani General Hospital in Basra, Iraq, where data collected after getting approval from the institutional ethical committee. This is a retrospective case record study which included adults (>20 year) inpatients admitted to these Hospitals with a diagnosis of UTIs who were treated for urinary tract infection from February to August 2013. In the present study 90 patients were included and accepted to answer the included questions (The questionnaire was performed depending on the availability of cases in the mentioned hospitals; a sample of the questionnaire paper is shown in appendix A). Patients' answers were confirmed by reviewing the in-patient files for their disease states and drugs used for treatment. The sensitivity results from the files were further confirmed by reviewing the hospital laboratory archives.

Descriptive results were expressed as frequency and percentage include those describe the pattern of antibiotic utilization. Analysis was performed using Microsoft Office Excel 2007 and GraphPad Prism software for Windows (version 5.0, GraphPad Software, Inc., San Diego, CA).

Results:

A total of 90 patients were included in the study, out of which 36 (40%) were males and 54 (60%) were females.

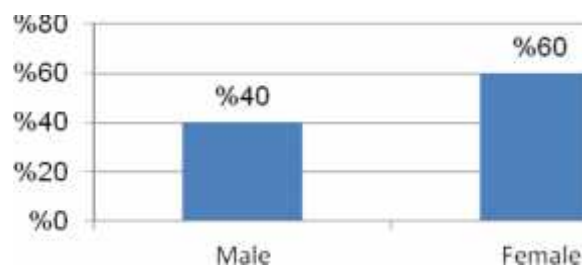


Figure-1: Prevalence of UTIs per sex distributions

The prevalence of UTIs per sex distributions were shown in figure-1. Among the culture positive patients (60%) had *E.coli* and remaining had *Pseudomonas Spp.* (5.55%), *Proteus Spp.* (3.33%) *Klebsiella Spp.* (12.22%), *Staphylococcus aureus* (17.7%) and *Streptococcus Spp.* (1%) infections as illustrated in figure-2.

Regarding antibiotic sensitivity pattern, the pathogens showed more sensitivity to imipenem (97% sensitive) followed by amikacin(94% sensitive) and less to ciprofloxacin, nitrofurantoin and amoxiclave, while the lowest sensitivity were shown in co-trimoxazole(24% sensitive) and cefotaxime(10% sensitive), all these data of isolated bacterial sensitivity clearly summarized in figure-3.

Since *Escherichia coli* was found to be the predominant cause of UTI among the isolates with 60% occurrence, data of culture and sensitivity were collected for mostly used antibiotics all these data clearly summarized in figure-4.

Figures 5, 6, 7 and 8 gave details about bacterial sensitivity percentages of most widely used antibiotics. For *proteus Spp.* amikacin, ciprofloxacin and co-trimoxazole show the highest sensitivity percent, for *Staphylococcus aureus Spp.* nitrofurantoin, imipenem and amikacin show the greatest sensitivity percent. While for *Pseudomonas Spp.* greatly inhibited by imipenem in other hand amikacin have the highest activity against *Klebsiella Spp.*

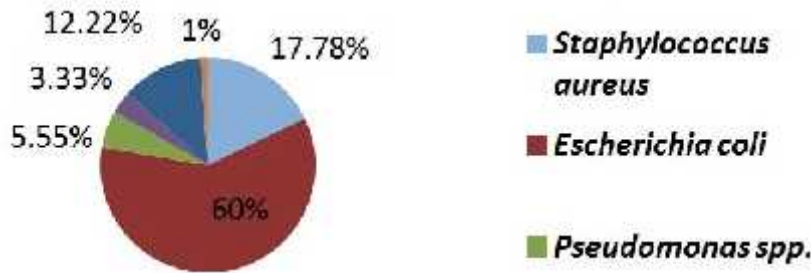


Figure-2: Percentages of Uropathogens isolated from patients with UTI in Basra, Iraq

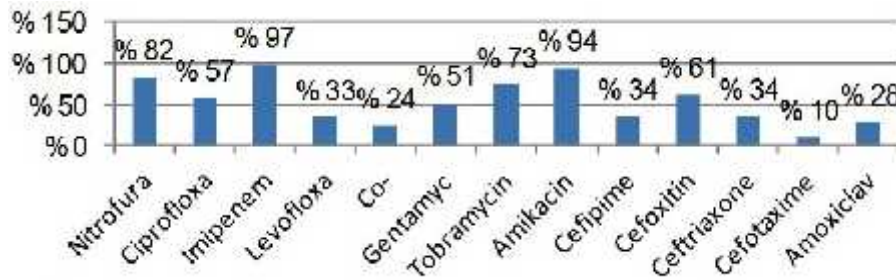


Figure-3: Antibiotic sensitivity pattern of bacteria isolated from patients with UTIs between Feb 2013 to Aug 2013.

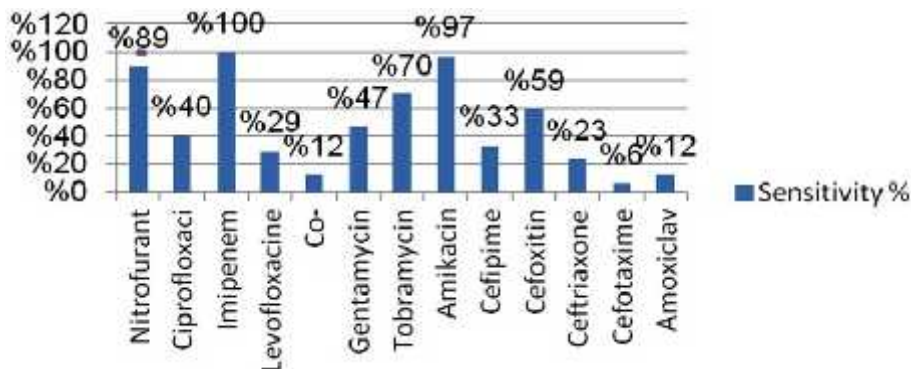


Figure-4: *E.coli* sensitivity percentage to antibiotics (*E.coli* account for 60% of UTIs in Basra, Iraq).

Figures 5, 6, 7 and 8 gave details about bacterial sensitivity percentages of most widely used antibiotics. For *proteus Spp.* amikacin, ciprofloxacin and co-trimoxazole show the highest sensitivity percent, for *Staphylococcus aureus Spp.* nitrofurantoin, imipenem and amikacin show the greatest sensitivity percent. While for *Pseudomonas Spp.* greatly inhibited by imipenem in other hand amikacin have the highest activity against *Klebsiella Spp.*

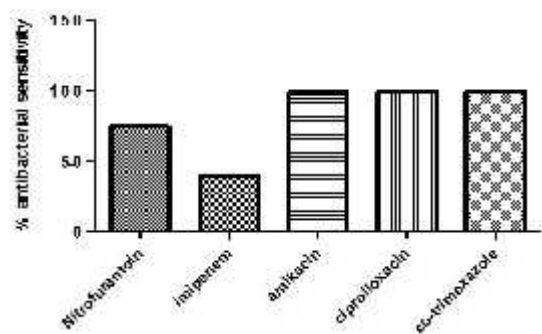


Figure-5: *Proteus Spp.* Sensitivity percentage to most widely used antibiotics.

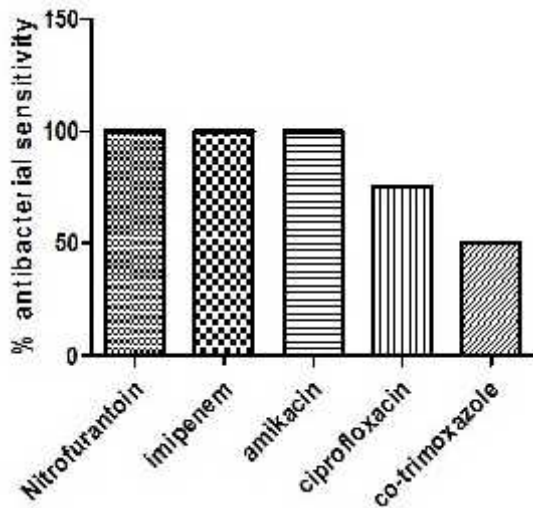


Figure-6: *Staphylococcus Spp.* Sensitivity percentage to most widely used antibiotics.

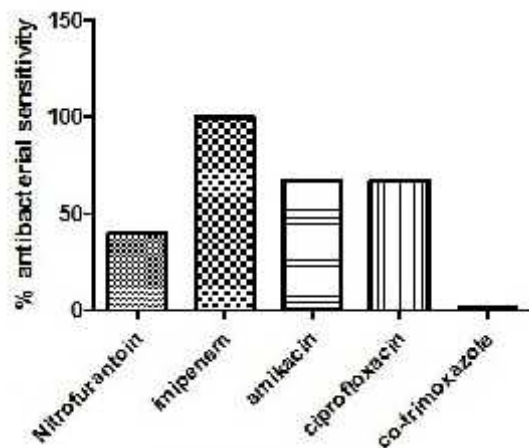


Figure-7: *Pseudomonas Spp.* Sensitivity percentage to most widely used antibiotics.

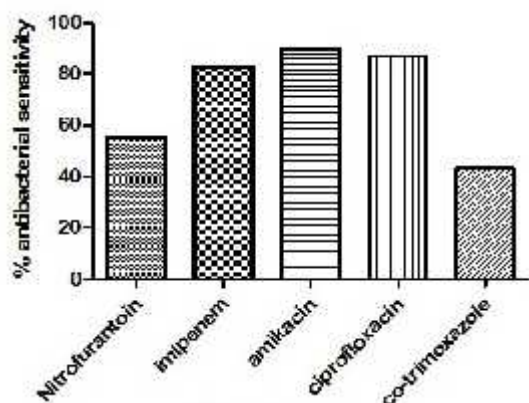


Figure-8: *Klebsiella Spp.* Sensitivity percentage to most widely used antibiotics.

Discussion:

The incidence of UTI and its clinical impact are very different for both sexes and at different stages of life. In the present study, it has been shown the higher prevalence of UTIs in females (60%) compared to males (40%). These results are agreement with other reports which showed that UTIs are much more common in women than men [7]. UTI caused by bacteria in urine which have the potentiality to change tissues of the urinary tract adjacent structures. The female more prone to UTI for anatomic reason due to short and straight urethra and short distance between urethra and anus contribute to easy colonization of the pre-urethral region with enteric bacteria. Add to that UTIs following sexual intercourse, during which bacteria may inadvertently be introduced to the urethra [8].

Our finding demonstrate bacterial involvement in UTI in Basra differ in their prevalence, unsurprisingly the most abundant species was *Escherichia coli*, followed by *Staphylococcus aureus* with moderate prevalence, with less number of cases there was *Klebsiella spp.*, while there were much less cases with *Pseudomonas spp.* and *Proteus spp.*, the least prevalence found within the study was *Streptococcus spp.* This clears that *E. coli* accounts for most UTI and require special considerations. Many retrospective and prospective studies in different countries found that *E.coli* is the most prominent cause of UTIs. Arul Prakasam *et al* show that *E.coli* (83.8%) was the most prevalent bacterial agent causing UTI in Kerala, furthermore *Escherichia coli* accounted for over 90% of the isolates in many previous reports [7,9,10].

The sensitivity to antibiotics in UTIs in Basra varies widely, regarding *E. coli* and *Staphylococcus aureus*, the use of nitrofurantoin, amikacin and Imipenem gave higher sensitivity percent. In other hand Amikacin, imipenem and ciprofloxacin are effective against *Pseudomonas spp.* and *Klebsiella spp.* Co-

timoxazole, ciprofloxacin, amikacin and nitrofurantoin are very effective against *Proteus* spp. The explanation of such finding seems to be little bit difficult since there are a wide variety of antibacterial and use or abuse in progress meanwhile resistance are very high. Guidelines for the approach to a patient with UTI include the requirement of identifying the causative organism by urine culture and choosing the most appropriate antibiotic through *in vitro* sensitivity tests. However, it is also evident that doctors find it necessary to start a patient on antibiotic information about local susceptibility patterns, this idea is very important to be consider in Iraq to decrease resistance pattern. The present study clearly demonstrate that cefotaxime and cotrimoxazole resistance are very high this gave an indication of large prescription of these two drugs in the previous years in treatment of UTI in Basra, Iraq.

This came in tune with many studies where *E. coli* resistance to cotrimoxazole was 48% in Jordanian patients with UTIs^[12]. In the Asia-Pacific region, nearly half of *Escherichia coli* urinary isolates were resistant to levofloxacin or ciprofloxacin and more than 30% were resistant to third-generation cephalosporins (cefotaxime, ceftriaxone, and ceftazidime)^[13]. So consideration of an optimal antimicrobial agent should be based on local resistance patterns, patient-specific factors, pharmacokinetic and pharmacodynamic principles, and cost.

In conclusion *E. Coli* is the most important treatment on an empiric basis, while awaiting the culture-sensitivity reports. Such empirical treatment is based on known susceptibility and resistance, as reported in the literature^[11]. For better decision-making, doctors need more cause of UTIs in Basra, Iraq with high prevalence ratio in females. Imipenem and amikacin are the first line drugs irrespective of the causative agent for UTIs, while cefotaxime and cotrimoxazole resistance are very high. This

highlights the necessity for a remedial education program within the health care system to improve adherence to the guidelines for the treatment of UTI.

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