Incidence and Antibiotic Susceptibility Pattern of Most Common Bacterial Pathogen Causing Urinary Tract Infection (UTI) in Tehran, Iran, 2012-2013

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Background: Among the most common infectious diseases, second ranking after respiratory (tract) system infection is urinary tract infection which involve (infects) about 250 million people in developing countries annually.

Objectives: The purpose of this study is to investigate the pattern of antibiotic resistance in common pathogens that cause urinary tract infection. This study is the first to evaluate the incidence of antibiotic resistance is the large number of samples in Iran.

Patients and Methods: The susceptibility of samples obtained from 14,332 patients with urinary tract infections admitted to different medical diagnostic laboratories of Tehran, was measured using disk diffusion method for 18 common antibiotics.

Results: Most of the identified bacteria were E. coli (64.56%) and Klebsiella pneumoniae (13.78%). The most resistant antibiotics were respectively identified as trimethoprim/sulfamethoxazole (61.35%) for E-coli and (49.6%) for Klebsiella sp. Also intermediate resistance to Nitrofurantion and Chlor tetracycline was observed.

Conclusions: The findings of this study indicate that E. coli is the predominant pathogen of this infection. There are also bacteria with high resistance that Interfere with prescription of drugs in order to treat urinary tract system infection. Also increasing of resistance to antibiotics among bacterial pathogens is evolving and requires an inspectoral and research procedure which could provide more information for doctors to treat the infection more efficiently.

Keywords: Drug Resistance; Microbial; Urinary Tract Infections; E. coli

1. Background

Among the most common infectious diseases, second ranking after respiratory (tract) system infection is urinary tract infection (1) which involve (infects) about 250 million people in developing countries annually (2). The distribution of these bacteria is different in different parts of the world and studying the microbial factors that cause this infection in all geographical regions, shows it’s dispersion. In recent studies microbial species that cause urinary system infection are classified by their target sites, such as urine infection (bacteriuria), bladder infection (cystitis), kidney infection (pyelonephritis), which can be asymptomatic or associated with symptoms (3, 4). There are several bacteria that could cause urinary tract infections, but E.coli is the most common among them. The frequency of pathogens is different, depending on age, gender, catheterization and hospitalization (5). The basis of suitable treatment in urinary infections is selecting a high performance and low cost antibiotic, and the main problem in the treatment of urinary system infections is the resistance of some bacteria to many common antibiotics (6). In the other hand, the spread of antibiotic resistance is almost always associated with increased use of antibiotics (7). So considering the daily increasing use of antibiotics which will be followed by antibiotic resistance and also different sensitivity of bacteria in different parts of the world, studying the antibiotic resistance in every region is necessary (8).

2. Objectives

This recent study aimed to determine the prevalence of resistance of commonly used antibiotics on common isolated bacteria of urinary system infections in Tehran from 14,322 samples. This study is the first to evaluate the incidence of antibiotic resistance is the large number of samples in Iran.

3. Patients and Methods

In a sectional descriptive study of 14,322 randomly se-
lected patients suffering from urinary system infection, referred to medical laboratories in Tehran, from March 2012 to March 2013, urine culture test was performed. Culture was prepared using the median urinary of the patients referred to Tehran’s laboratories.

3.1. Isolation and Identification of Bacteria
Isolation of these bacteria was performed using Streak-Plate Method on Blood agar and MacConkey agar culture with standard loop (internal diameter 34.1 mm). Culture plates were incubated at 37 °C for 24 h. The cultures consisting of more than 10^5 colonies of particular bacteria were considered as positive cultures. The incubation of negative 24 h cultures was extended for another 24 hours. Bacteria were identified through performing biochemical tests (indole, citrate, oxidase, and production of H2S, lysine decarboxylase, fermentation of lactose, urea hydrolysis, gas production, catalase, coagulase, mannitol fermentation and susceptibility testing Novobiocin).

3.2. Antibiotic Susceptibility Testing
Strains drug resistance evaluation was carried out using disk diffusion method and Kirby Bauer method on Mueller-Hinton medium (Merck, Germany) (9). After inoculating the bacteria on Muller Hinton agar and placing the antibiotic disks, plates were incubated for 24 hours in incubator. Then, according to the size of the growth inhibition zone around the disks and international numbers of (CCLSI), results were categorized and reported in three groups: susceptible and Sensitive (S), intermediate susceptibility or sensitivity (I) and resistance (R).

3.3. Statistical Method
P value was measured by the χ2 test with Yates’ correction.

4. Results
Of 14332 patients that were studied, E-coli had the highest frequency among bacteria and after that Klebsiella had the second place (Figure 1). Of the mentioned bacteria (E.coli and Klebsiella) 1298 and 347 cases of all samples (2241) belonged to males and 7956 and 1629 cases of all samples (12091) belonged to females, respectively.

4.1. Antibiotic Susceptibility Test Results
The antibacterial strength of 18 classes of antibiotics used in Iran, against species causing urinary tract infections was studied. E-Coli as the most common cause of urinary infections showed the highest sensitivity to Nitrofurantoin by 6.85%, the highest average sensitivity to Gentamicin by 40% and maximum resistance to sulfamethoxazole/Trimethoprim by 1.63% (Figure 2). Also Klebsiella pneumoniae that is the second ranking bacterium in this study, showed the highest sensitivity towards Norfloxacin by 76.6%, intermediate sensitivity to Gentamicin by 41.9%, and finally the highest resistance was shown towards sulfamethoxazole/Trimethoprim by 49.6%. Antibiotic susceptibility results are given in Figure 3.

Figure 1. Prevalence of Bacterial Urinary Tract Infections in Tehran 2012-2013

Figure 2. Antibiotic Resistance Pattern in Escherichia coli
E-coli better reaction to isolated... Among these antibiotics Nitrofurantoin showed a controlled and an efficient strategy to counter and stop the Fluoroquinolones in treatments should seriously be... This findings showed that using... These results were the same as other Iranians researches (11). This approach also needs careful and extensive monitoring at the healthcare centers, so that we wouldn’t face the increase of resistance in these bacterial agents (organisms).

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Authors’ Contribution
All authors have participated equally in this study.

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