

Antibiotic Resistance Pattern in Urinary Tract infections in Imam-Ali Hospital, Zahedan (2010-2011)

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Article information	Abstract
Article history: Received: 16 Aug 2011 Accepted: 6 May 2012 Available online: 7 July 2012	<p>Background: Treatment for urinary tract infection should be based on common uropathogens and their resistance to antibiotics. The aim of this study was to evaluate antibiotic resistance patterns in urinary tract infection.</p> <p>Materials and Methods: In this cross-sectional study, 11 common antibiotics were evaluated with antibiogram on urine samples of 2876 cases with urinary tract infection during 2010-2011.</p> <p>Results: The most common uropathogen was <i>E. coli</i> (62.41%) and highest resistance of pathogen was against cefixime (84.5%) in this study.</p> <p>Conclusion: As the least resistance of uropathogens was against ciprofloxacin, we propose this antibiotic as the first line treatment for urinary tract infection.</p>
Keywords: Urinary tract infection Bacteria Antibiotic resistance	
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Introduction

Urinary tract infection (UTI) is the most common bacterial infection in community. About 150 million people are diagnosed with UTI worldwide each year [1]. Its prevalence varies with age and sex and clearly it involves women more than men because of anatomical differences [2]. *E. coli* from *Enterobacteriaceae* family is underlying pathogen in at least 80% of cases. Other less common pathogens include *Klebsiella*, *Proteus*, *Enterobacter* spp, etc [3].

Early treatment of UTI with appropriate antibiotics is very important because of its complications [4]. Microorganisms could adapt to environmental conditions in different ways, one which is drug resistance [5]. Regarding to increased drug resistance of microorganisms, previous effective antibiotics no longer have effects on uropathogens due to bacterial genetic factors, increased populations, travels, and misuse of antibiotics [6].

There are different mechanisms for drug resistance based on bacterial strain and type of antibiotic. Thus, defining the antibiotic resistance pattern in common pathogens is critical for conducting empirical and specific treatment against a pathogen [7].

Since antibiotic therapy in UTI should rely on the epidemiology and resistance patterns of common uropathogens [8], this study is designed to determine resistance pattern of uropathogens in Zahedan so that we could find reasonable solutions for UTI treatment in this region.

Materials and Methods

All urine samples taken from outpatients referring to central laboratory of Ali Ebne Abi'taleb hospital of Zahedan medical university during years 1389 to 1390 entered in this descriptive cross sectional study. Midstream urine samples were collected and cultured with a standard method [3]. Thereafter, bacterial genus and species were identified and confirmed with standard methods [4].

After final identification, to perform drug susceptibility test, the standard method of disk diffusion (Kirby Bauer) was used on Mueller-Hinton agar plates and following the National Committee of Clinical Laboratory Standards (NCCLS) criteria, appearing of inhibition zone and its diameters were examined [9]. 11 antibiotics, frequently used in UTI treatment, were tested. Data were analyzed with SPSS-17.0 software and Chi-Square and descriptive tests. P-values less than 0.05 were considered as statistically significant. We tried to consider ethical issues about studying on patients and their samples.

Results

A total of 2876 patients (1627 women [56.58%] and 1249 men [43.42%]), aged from younger than 1 month to 91 years (mean 21.7 years), were studied. In evaluation of studied specimen, 697 samples (522 females and 175 males) had positive culture result and there was a statistically significant relation between gender and UTI ($p=0.005$).

Table 1. Frequency of bacterial pathogens isolated from positive cultures

Organisms	Frequency N (%)		
	Male	Female	Total
Escherichia coli	97 (55.42)	338 (64.75)	435 (62.41)
Enterobacter spp	24 (13.71)	73 (13.98)	97 (13.91)
Klebsiella spp	12 (7.05)	39 (7.47)	51 (7.31)
Proteus spp	10 (5.71)	29 (5.55)	39 (5.59)
Pseudomonas spp	8 (4.57)	19 (3.63)	27 (3.87)
Staphylococci spp	7 (4)	12 (2.29)	19 (2.72)
Others	17 (9.71)	12 (2.29)	29 (4.16)
Total	175 (100)	522 (100)	697 (100)

Table 2. Antimicrobial resistance patterns of bacterial pathogens isolated from positive cultures

Organisms	Frequency N (%)						
	Escherichia Coli	Enterobacter spp	Klebsiella spp	Proteus spp	Pseudomonas spp	Staphylococci spp	Total
Antibiotic							
Amikacin	67 (15.4)	17 (17.52)	13 (5.49)	19 (48.71)	10 (37.03)	11 (57.58)*	134 (100)
Imipenem	216 (49.65)	51 (52.57)	27 (52.94)*	31 (79.48)	13 (48.14)	12 (63.15)	350 (100)
Tobramycin	202 (46.43)	29 (29.89)	6 (11.76)	13 (33.33)	9 (33.33)	10 (52.63)*	269 (100)
Gentamicin	114 (16.35)	25 (25.77)	14 (27.45)	10 (25.64)	3 (11.11)	4 (21.05)	170 (100)
Cephalotin	248 (35.58)	65 (67.01)	41 (80.39)	24 (61.53)	14 (51.85)	16 (84.21)*	408 (100)
Ceftriaxone	261 (60)	56 (57.73)	39 (76.47)	21 (53.84)	17 (62.96)	7 (36.84)	401 (100)
Cefixime	423 (97.24)*	68 (70.10)	30 (58.82)	37 (94.87)	23 (85.18)	8 (42.1)	589 (100)
Sulfamethoxazole	332 (76.32)	62 (63.91)	15 (29.41)	16 (41.02)	21 (77.77)	15 (78.94)*	461 (100)
Ciprofloxacin	78 (17.93)	19 (19.58)	4 (7.84)	5 (12.82)	6 (22.22)	2 (10.52)	114 (100)
Kanamycin	274 (62.98)	71 (73.19)	21 (41.17)	22 (56.41)	18 (66.66)*	13 (68.42)	437 (100)
Nitrofurantoin	83 (19.08)	21 (21.64)	11 (21.56)	7 (17.94)	7 (25.92)	5 (26.31)	137 (100)

* Statistically significant.

Among the isolates from urinary tract, the most and least common uropathogens were *E. coli* (62.41%) and *Staphylococcus species* (2.72%) respectively (Table 1).

The highest resistance rate of uropathogens in both genders regardless of bacterial strain was against cefixime (84.5%) and sulfamethoxazole (66.14%). ciprofloxacin and nitrofurantoin had the lowest resistance rate (16.35% and 19.22% respectively) in both women and men. In addition, this study showed a statistically significant resistance of several bacteria against certain antibiotics ($p=0.0001$). As the most common uropathogen, *E. coli* showed the most and least resistance to cefixime (97.24%) and amikacin (15.4%) respectively (Table 2).

Discussion

The results of our study show that *E. coli* is the most common pathogen (61.41%) causing UTI. Studies conducted in other regions of Iran and also all over the world reported this microorganism as the most common uropathogen with 45.4-78.58% prevalence rate. Frequency of *E. coli* was 45.4% in Madani et al. study on 10492 samples in Kermanshah [10] and 58% in Kader et al. study on 11659 patients in Saudi Arabia [11]. Furthermore, Akram et al. in a study on 920 samples in India [1] and Rostam'zadeh et al. in a study on 803 patients in Urmia reported 60% and 78.58% prevalence rate of *E. coli* respectively [12].

Our study showed that *E. coli* has a higher frequency compared to other microorganisms in women with UTI than men which is probably because of shortness of urethra and closeness of its outlet to vagina and anus in women. In the study of Savadkouhi et al. on 160 patients

in Babol [13] and Vaez'zadeh et al. on 6656 patients in Tehran [14], UTI was more common in females.

As the most common uropathogen, *E. coli* had the most and least urinary resistance to cefixime and amikacin respectively.

In this study, the highest resistance rate of uropathogens in both genders regardless of bacterial strain was against cefixime (84.5%) and sulfamethoxazole (66.14%). The lowest resistance rate in women and men belonged to ciprofloxacin (16.35%) and nitrofurantoin (19.22%). However, Safdari et al. in a study on 6044 samples in Mash'had⁴ and Vaez'zadeh et al. in a survey on 6656 patients in Tehran [14] reported the highest and lowest resistance rate against ampicillin and amikacin respectively. Likewise, ampicillin and ciprofloxacin had the highest and lowest resistance rate in Madani et al. study on 10492 samples in Kermanshah [10].

According to the similar results about the least antibiotic resistance to amikacin and ciprofloxacin, we can conclude the unique drug prescription pattern in various regions of Iran and suggest these two drugs as the first line empiric treatment for UTI.

According to our study, *E. coli* is known as the most common uropathogen. The highest resistance rate in both women and men regardless of bacterial strains was against cefixime and sulfamethoxazole in our region which exclude the two drugs from first line antibiotic treatment.

In addition, ciprofloxacin is suggested as the first line of antibiotic therapy because of the lowest resistance rate. Antibiotic resistance pattern is different in various regions and there is also an increasing resistance to new antibiotics. Thus, periodic evaluation of antibiotic

resistance pattern in every region for an appropriate empirical and specific treatment of UTIs is recommended.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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