

Community-Acquired Urinary Tract Infection (Etiology and Bacterial Susceptibility)

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ABSTRACT

Objectives: The aim of this study was to report the prevalence of uropathogens and their antibiotic susceptibility of the community acquired UTI diagnosed in our institution and to provide a national data.

Methods: We analyzed retrospectively the results of urine cultures of 416 patients that had community acquired urinary tract infection and had urine sampled in the Central Laboratory of the Ministry of Health in Amman the capital of Jordan, January to June of 2011.

Results: The most commonly isolated organism was *Escherichia coli* (70%). β -Hemolytic *Streptococcus group B* (8%) and *Klebsiella sp* (7.6%) were reported as the next most common organisms. Of all bacteria isolated from community acquired UTI, only 21% were sensitive to ampicillin, 23% to ciprofloxacin and 18% to cotrimoxazole. The highest levels of susceptibility were to cephalothin (81%), Gentamicin (40%), Augmentin (33%), Norfloxacin (28%), Nitrofurantion (23%), Lefloxacin (21%), Nalidixic acid (16%), Imipenem (14%).

Conclusion: Gram-negative agents are the most common cause of UTI. Cephalothin remains the choice among the orally administered antibiotics, followed by Gentamicin, Augmentin. For severe disease causes by *Escherichia coli* which is the most common cause community acquired UTI that require antibiotics such as nitrofurantion, followed by third generation cephalosporins, which were the most effective.

Keywords: Urinary tract; Infection; Community; Bacteria; Antibiotic; Susceptibility.

INTRODUCTION

Community-acquired urinary tract infections (UTIs) are among the most common bacterial infections in women. Therapy for these infections is usually begun before results of microbiological tests are known. Furthermore, in women with acute uncomplicated cystitis, empirical therapy without a pretherapy urine culture is often used. The rationale for this approach is based on the highly predictable spectrum of etiologic agents causing UTI and their antimicrobial resistance patterns.

The aim of this study was to report the information about the uropathogens and their antibiotic susceptibility of the community acquired UTI diagnosed in our institution and to provide a recent national data.

METHODS

We analyzed the results of urine cultures of 419 patients that had community acquired urinary tract infection [3×10^5 colony-forming units (CFU/mL)¹¹] and had urine sampled in the Central Laboratory of the Ministry of Health in Amman the capital of Jordan, January to June of 2011. **Antimicrobial susceptibility testing by the disk diffusion method (Kirby-Bauer) & Antibiotic profil. Statuistical analysis have been done by ANOVA**

RESULTS:

The results of urine cultures of 419 patients that had community acquired urinary tract infection. The prevalence of the community acquired urinary tract infection in female almost six times the men (86% vs. 14%). Table 1

Table 1: The prevalence of male vs. female.

months	N ^o of female	N ^o of male
January	32	1
February	27	3
March	27	7
April	26	5
May	30	10
June	35	5
July	34	5
August	21	2
September	38	8
October	36	4
November	19	4
December	32	5
Total	357	59
Percentage	86%	14%

Pathogens

The most commonly isolated organism was *Escherichia coli* (70%), β -Hemolytic *Streptococcus group B* (8%) and *Klebsiella sp* (7.6%) were reported as the next most common organisms. The others bacteria are summarized in Table 2.

Table 2: Micro-organism isolated in urine.

Agents	Number (416)	%
<i>E.coli</i>	292	70.2
<i>Streptococcus group B</i>	34	8.2
<i>Klebsiella sp</i>	32	7.7
<i>Enterococcus sp</i>	15	3.6
<i>Staphcoagulase negative</i>	14	3.4
<i>Acinetobacter sp</i>	10	2.4
<i>Proteus sp</i>	6	1.4
<i>S. aureus</i>	4	0.96
<i>Pseudomonas sp</i>	4	0.96
<i>Enterobacter</i>	3	0.7
<i>Morganella sp</i>	1	0.2
<i>Providencia sp</i>	1	0.2

Bacterial susceptibility

The comparison of the susceptibility pattern of organisms to various antimicrobial agents from all the specimens was shown in Table 3. *Escherichia. coli* showed high susceptibility to nitrofurantoin (87%) then gentamicin (74%); to ceftaxime (72%); fluoroquinolones: norfloxacin (55%), ciprofloxacin (38%) and levofloxacin (48%); second and third generation cephalosporins and imipenem. There was a low susceptibility pattern of *E. coli* to ampicillin (29%), imipenem (14%) and amikacin (6%).

Table 3: Antibiotic susceptibility of uropathogens.

β - Hemolytic *Streptococcus group B* was highly susceptible to ampicillin (82%) and augmentin (26%); to cephalothin (26%); to cephalosporin: cefoxitin (21%). Nevertheless, there was a decreased susceptibility to norfloxacin (0%), ciprofloxacin (0%), cotrimoxazole (6%) and leftoxacin (3%).

Klebsiella sp was highly susceptible to aminoglycosides: gentamicin (40%) and amikacin (84%); to cephalosporins: cefotaxime (43%) and cephalothin (44%). Nevertheless, there was a decreased susceptibility to nitrofurantoin (23%), norfloxacin (28%), ciprofloxacin (11%), cotrimoxazole (18%) and ampicillin (21%). (Table 3)

Percentage of susceptible micro-organisms

Drugs	E.coli (%)	β - Hemolytic <i>Streptococcus</i> group B (%)	<i>Klebsiella sp</i> (%)	General (%)
Gentamicin	74	12	75	40
Cefotaxime	72	21	66	43
Nitrofurantion	87	20	56	23
Norfloxacin	55	0	62	28
Leftoxacine	48	3	18	21
Ciprofloxacin	38	0	24	11
Augmentin	38	26	25	33
Cephalothin	36	26	44	44
Cotrimoxazole	36	6	56	18
Nalidixic acid	34	0	53	13
Ampicillin	29	82	0	39
Imipenem	14	-	16	14
Amikacin	5	-	4	4
Ceftazidime	6	-	3	3
Cephradin	9	4	6	5

Of all bacteria isolated from community acquired urinary tract infection, only 39% were sensitive to ampicillin, 44% to cefalothin and 18% to cotrimoxazole. The highest levels of susceptibility were to ceftaximne (43%), gentamicin (40%), levofloxacin (21%), nitrofurantoin (23%), norfloxacin (28%) and ciprofloxacin (11%). (Table 3)

DISCUSSION

Urinary tract infection occurs according to the demographic data, it is more frequent in woman.

The present study is retrospective, using the results of our routine diagnostic and susceptibility analysis. These data are from the Central Laboratory of the Ministry of Health in Amman the capital of Jordan , the patients are screened in the primary and secondary level of healthy system and prone to associated conditions and diseases. These factors may influence the patterns of the data herein presented. We are concerned about the necessity of periodical re-evaluation of bacterial etiology and antibiotic resistance in each health unit and of a national surveillance to avoid the rise of the antimicrobial resistance.

In the community, it is important to guide the general practitioners that generally treat empirically the UTI, for what they need to be aware of the locally prevalent strains and their sensitivity pattern. Geographic variations in pathogen

occurrence and susceptibility profiles require frequent monitoring to provide information to guide the therapeutic options. Unfortunately, there is few studies published on the prevalence of strains and their antimicrobial susceptibilities in different places in the world .

We found that *E. coli* is the predominant bacterium in urine samples, corresponding to 58% of the cases. This is in accordance with previous studies¹⁰⁻¹¹, however in a study from Norway¹¹ *E. coli* caused 70% of UTI in outpatients compared to 58% in the present study. A lower proportion of UTI was caused by β - Hemolytic *Streptococcus group B* (8%) and *Klebsiella sp* .

E. coli exhibited resistance to the commonly used antibiotics, and the most effective in-vitro agents were found to be aminoglycosides: nitrofurantion (87%) and gentamicin (74%) among the injectables; and fluoroquinolonas: norfloxacin (55%), ciprofloxacin (38%) and levofloxacin (48%) among the orally administered ones. Other useful oral antibiotic is augmintin (38%). The organisms showed resistance to common used urinary antibiotics like ampicillin (17%), amikacin (8%) and cephradine(9%), in disagreement with data published by others^{13,17,18} .

In summary, nitrofurantion remains the choice among the orally administered antibiotics, followed by gentamicin, second and third generation cephalosporins. To treat severe illness one may use the injectable antibiotics, and among then, we should choice aminoglycosides, third generation cephalosporin, fluoroquinolones or imipenem, which were the most effective ones. The high resistance patterns to ampicillin, amikacin and cephradine, should be remembered.

CONCLUSION

The most common community acquired UTI is caused by negative-Gram agents. nitrofurantion remains the choice among the orally administered antibiotics, followed by gentamicin second and third generation cephalosporins. For severe disease that require parenteral antibiotics the choice should be aminoglycosides, third generation cephalosporin, fluoroquinolones or imipenem, which were the most effective.

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