ejpmr, 2019,6(10), 697-699

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

E.COLI RESISTANCE TO FIRST-LINE TREATMENTS: A BURDEN TO HEALTH CARE SYSTEMS

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Article Received on 20/08/2019 **Article Revised on 10/09/2019** **Article Accepted on 01/10/2019**

ABSTRACT

Objective: This study aimed to determine E.coli bacteria causing urinary infections resistance to different antibiotics. **Materials and methods:** This is a retrospective study at Alhomsi laboratory between 1/5/2018 and 30/8/2019) including all samples of E.coli infections during the studied period. **Results:** We found 137 samples with E.coli Infection. The most resistance was against Trimethoprim/Sulfamethoxazole, while the highest sensitivity against E.coli was by Amikacin. **Conclusion:** Resistance of the E.coli in our study to different antibiotics (especially those which are considered first line treatment) is a major issue of antibiotic abuse that could lead to more resistant bacteria and a huge burden on general healthcare.

KEYWORDS: E.coli, Trimethoprim/Sulfamethoxazole.

INTRODUCTION

Urinary tract infections (UTIs) are among the most common types of bacterial infections occurring both in the community and hospital settings.[1,2] There are two types of UTIs: hospital associated urinary tract infection (HAUTIs), and community-associated urinary tract infection (CAUTIs).[3] Women are the predominant group of patients with CAUTIs.[1,2] UTIs was estimated to represent 100,000 hospitalizations, 7 million visits and 1 million admissions to emergency services in USA.[4,5] The economic and public health burdens of UTIs is substantial and markedly affect the quality of life of infected patients.[6,7]

The majority of UTIs are caused by E. coli bacteria, followed by Proteus spp., Staphylococcus saprophyticus, Klebsiella spp. and other Enterobacteriaceae.[8,9] However, among bacteria causing UTIS, E. coli is considered as the most predominant cause of both community and nosocomial UTIs. Antibiotics commonly recommended for treatment of UTIs include co-trimoxazole (trimethoprim/sulfamethoxazole), nitrofurantoin, ciprofloxacin and ampicillin.[3,10] However, there is global increase in antibiotic resistance among urinary tract pathogens, including resistance pattern observed in Saudi Arabia[11–14] which limit treatment options.

MATERIALS AND METHODS

This study was a retrospective study of all the urine cultures with Enterobacter infection of the patients who reviewed Alhomsi laboratory between 1/5/2018 to 30/8/2019. This study included 137 cases. All samples were urine samples with E.coli infection and all samples were cultured on Eosin Methylene Blue (EMB agar). Only the authors to ensure the privacy collected all the data and all the names and personal information were blinded. Informed consent was taken from all the patients to be included in this study. Statistical analysis was done using SPSS 25.0.

RESULTS

Table 1: Variables of Our Study.

Gender	**N**	**%**
Female	116	84.7
Male	21	15.3
Source of sample	**N**	**%**
Urine	137	100
Total	137	100.0

Table 2: Antibiotics used and tested in our study:

Antibiotics Tested
Amikacin
Ampicillin
Amoxicillin
Amoxicillin /Clavulanic Acid
Azithromycin
Cefaclor
Ceftriaxone
Ciprofloxacin
Nalidixic acid
Nitrofurantoin
Erythromycin
Trimethoprim/Sulfamethoxazole
Gentamycin

Table 3: Resistance and Sensitivity of the most predominant Antibiotics:

Antibiotics	Resistance and Sensitivity	N	%	Total
Amikacin	**Sensitive**	129	94.2	137
Nalidixic acid	**Resistant**	108	78.8	
Nitrofurantoin	**Resistant**	96	70.1	
Trimethoprim/ Sulfamethoxazole	**Resistant**	113	82.5	

DISCUSSION

This study was done to determine the resistance of E.coli causing urinary infections to commonly used antibiotics. Our study included 137 cases of urinary infection with E.coli with a predominance of females 116 cases (84.7%) and 21 cases males (15.3%).

A similar study[15] compared the resistance of E.coli to different antibiotics. It showed that the highest resistance was to Ampicillin (68.9%) followed by ciprofloxacin (23.6%), while the least resistance was to Imipenem (0%) and Meropenem (0.8%) followed by Amikacin (1%), which is similar to our study (Discussed below).

Another study[16] showed that E.coli resistance to Fluoroquinolones was (31.3%), which was the highest. Moreover, E.coli resistance to Cephalosporins was (6%), while the lowest resistance was to Carbapenems (0.2%).

In our study, E.coli was resistant to Nalidixic acid, Trimethoprim /Sulfamethoxazole and Nitrofurantoin, which are the main treatment for urinary infections by E.coli.[17]

Amikacin was the only antibiotic which sensitivity was more predominant in our study, and this could be due to the fact that amikacin is only available as injections and not orally, which could be the cause of this finding.

All other antibiotics tested in our study had a variety of resistance and sensitivity, in this study we just focused on the antibiotics that were predominant in either sensitivity or resistance.

Compliance with Ethical Standards

Funding: This study was not funded by any institution.

Conflict of Interest: The authors of this study have no conflict of interests regarding the publication of this article. **Ethical approval**: The names and personal details of the participants were blinded to ensure privacy.

REFERENCES

1. Car J. Urinary tract infections in women: diagnosis and management in primary care. BMJ, 2006; 332(7533): 94–97. doi: 10.1136/bmj.332.7533.94. [PMC free article] [PubMed] [CrossRef] [Google Scholar].
2. Lee JBL, Neild GH. Urinary tract infection. Medicine, 2007; 35(8): 423–428. doi: 10.1016/j.mpmed.2007.05.009. [CrossRef] [Google Scholar].
3. Tandogdu Z, Wagenlehner FM. Global epidemiology of urinary tract infections. Curr Opin Infect Dis., 2016; 29(1): 73–79. doi: 10.1097/QCO.0000000000000228. [PubMed] [CrossRef] [Google Scholar].
4. Taur Y, Smith MA. Adherence to the infectious diseases society of America guidelines in the treatment of uncomplicated urinary tract infection. Clin Infect Dis., 2007; 44(6): 769–774. doi: 10.1086/511866.[PubMed] [CrossRef] [Google Scholar].
5. Schappert SM, Burt CW. Ambulatory care visits to physician offices, hospital outpatient departments, and emergency departments: United States, 2001–2002. Vital Health Stat., 2006; 13(159): 1–66. [PubMed] [Google Scholar].
6. Kostakioti M, Hultgren SJ, Hadjifrangiskou M. Molecular blueprint of uropathogenic *Escherichia coli*virulence provides clues toward the development of anti-virulence therapeUTIscs. Virulence, 2012; 3(7): 592–594. doi: 10.4161/viru.22364. [PMC free article] [PubMed] [CrossRef] [Google Scholar].
7. Alanazi MQ, Al-Jeraisy MI, Salam M. Prevalence and predictors of antibiotic prescription errors in an emergency department, Central Saudi Arabia. Drug Healthc Patient Saf, 2015; 7: 103–111. .[PMC free article] [PubMed] [Google Scholar].
8. Gupta K, et al. The prevalence of antimicrobial resistance among uropathogens causing acute uncomplicated cystitis in young women. Int J Antimicrob Agents, 1999; 11(3–4): 305–308. doi: 10.1016/S0924-8579(99)00035-7. [PubMed] [CrossRef] [Google Scholar].
9. Kahlmeter G. The ECO. SENS Project: a prospective, multinational, multicentre epidemiological survey of the prevalence and antimicrobial susceptibility of urinary tract pathogens—interim report. J Antimicrob Chemother, 2000; 46(Suppl 1): 15–22. doi:

10.1093/jac/46.suppl_1.15. [PubMed] [CrossRef] [Google Scholar].
10. Foxman B. The epidemiology of urinary tract infection. Nat Rev Urol, 2010; 7(12): 653–660. doi: 10.1038/nrurol.2010.190. [PubMed] [CrossRef] [Google Scholar].
11. Al Yousef SA, et al. Clinical and laboratory profile of urinary tract infections associated with extended spectrum beta-lactamase producing *Escherichia coli* and *Klebsiella pneumoniae*. Ann Clin Lab Sci, 2016; 46(4): 393–400. [PubMed] [Google Scholar].
12. Kader AA, Kumar A. Prevalence and antimicrobial susceptibility of extended-spectrum beta-lactamase-producing *Escherichia coli* and *Klebsiella pneumoniae* in a general hospital. Ann Saudi Med, 2005; 25(3): 239–242. [PMC free article] [PubMed] [Google Scholar].
13. Al-Harthi AA, Al-Fifi SH. Antibiotic resistance pattern and empirical therapy for urinary tract infections in children. Saudi Med J., 2008; 29(6): 854–858. [PubMed] [Google Scholar].
14. Al-Tawfiq JA, Anani AA. Antimicrobial susceptibility pattern of bacterial pathogens causing urinary tract infections in a Saudi Arabian hospital. Chemotherapy, 2009; 55(2): 127–131. doi: 10.1159/000198698.[PubMed] [CrossRef] [Google Scholar].
15. Al Sweih, N., et al., National surveillance of antimicrobial susceptibility of CTX-M-positive and-negative clinical isolates of Escherichia coli from Kuwait government hospitals. Journal of Chemotherapy, 2010; 22(4): 254-258.
16. Edelsberg, J., et al., *Prevalence of antibiotic resistance in US hospitals.* Diagnostic microbiology and infectious disease, 2014; 78(3): 255-262.
17. Alanazi MQ, Alqahtani FY, Aleanizy FS. An evaluation of E. coli in urinary tract infection in emergency department at KAMC in Riyadh, Saudi Arabia: retrospective study. Ann Clin Microbiol Antimicrob, 2018; 17(1): 3. Published 2018 Feb 9. doi:10.1186/s12941-018-0255-z.