

Antibiotic Susceptibility of *Escherichia coli* Strains Isolated from Clinical Samples

Ozan Emre Eyupoglu¹, Ikbal Merve Secen²

¹ Assistant Professor, Dr., Istanbul Medipol University, School of Pharmacy, Biochemistry Department, Turkey.

² Pharmacist, School of Pharmacy, Istanbul Medipol University, Turkey.

*Corresponding Author:

Ozan Emre Eyupoglu,
Assistant Professor Dr., Istanbul Medipol University, School of Pharmacy, Biochemistry Department, Head of Basic Science of Pharmacy, Head of Biochemistry Department, Kavacak South Campus, Goztepe Dist. Ataturk Str. No.40, 34810, Beykoz-Istanbul/Turkey.
Tel: +905385882070
Email: oeyupoglu@medipol.edu.tr

Received: December 02, 2019

Accepted: December 30, 2019

Published: December 31, 2019

Copyright: ©2019 Ozan Emre Eyupoglu. This is an Open Access article published and distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Abstract

Antibiotic resistance has become a concern throughout the world. *Escherichia coli* is a member of the *Enterobacteriaceae* family which is naturally found in human microbiota and can become pathogenic with various virulence factors. There are many studies on the antibiotic susceptibility of *Escherichia coli* strains in our country. The aim of this retrospective study was; to determine the resistance of *E.coli* strains isolated from urine cultures to some antibiotics between November 2017 - November 2018. Antibiotic susceptibility tests were performed using the VITEK 2 Compact[®] automated system. The study was planned retrospectively. The susceptibility of isolated *E.coli* strains to amoxicillin/clavulanic acid, ampicillin, imipenem, levofloxacin, meropenem, nitrofurantoin, cefepime, cefotaxime, ciprofloxacin, trimethoprim-sulfamethoxazole were investigated. The strains showed high resistance to ampicillin at 65% and the least resistance to meropenem 1% and imipenem 2%. High resistance to certain antibiotics is a serious problem. Antibiotic use and resistance development should be monitored and antibiotic use policies should be developed.

Keywords: *Enterobacteriaceae*; *Escherichia Coli*; Drug Resistance; Bacterial; Retrospective Studies.

Introduction

Microorganisms find new ways to escape from antibiotics developed with their ability to adapt quickly to conditions and cause antibiotic resistance problem, which is the most important obstacle in the treatment of infections [1].

Antibiotic resistance is that some bacterial strains are not affected by antibiotics or the strain becomes resistant by acquiring some resistance mechanisms. Acquired antibiotic resistance may be caused by mutations in the bacterial chromosome or by the transfer of the resistance gene to a susceptible bacterium by a resistant bacterium. Antibiotic resistance may be caused by inhibiting the access of the antibiotic to the target site, changing the target site or inactivating with enzyme synthesis [2, 3].

Today, antibiotic resistance increases day by day due to the increase in intensive care units and the increase in antibiotic use. *Escherichia coli* is one of the most frequently encountered bacterial resistance factors. Since antibiotic use is more common in hospitals, resistance problem is more intense [2, 4].

Escherichia coli, a member of the *Enterobacteriaceae* family, which is frequently isolated in clinical specimens, causes infections such as hemolytic uremic syndrome, urinary tract infections, sepsis, pneumonia, meningitis, abscess, diarrhea, sinusitis [5]. Since *E.coli* is found in humans gastrointestinal system flora as well as in nature, in water and in soil, infections can be caused by ingestion of bacteria from the external environment [6].

Although *E.coli* is generally harmless, it can acquire virulence genes and become pathogenic in humans [7]. Clinically important *E.coli* strains of human origin are classified into three main groups: extraintestinal pathogenic *E.coli* (ExPEC), commensal *E.coli*, intestinal pathogenic *E.coli* (IPEC) [8].

In this study, the susceptibility of *Escherichia coli* isolates isolated from samples from Istanbul Medipol Mega University Hospital Microbiology Laboratory to various antibiotics were determined.

In this retrospective study, *E.coli* strains isolated from urine cultures of 253 outpatients and inpatients between November 2017

and November 2018 were examined. It was aimed to determine the antimicrobial susceptibility profiles of these strains for amoxicillin/clavulanic acid, ampicillin, imipenem, levofloxacin, meropenem, nitrofurantoin, cefepime, cefotaxime, ciprofloxacin, trimethoprim-sulfamethoxazole.

Materials and Methods

The samples that were taken to the Microbiology Laboratory of Istanbul Medipol Mega University Hospital between November 2017 - November 2018 and whose culture antibiogram was requested were identified biochemically by VITEK 2 Compact (Biomerius, France). Antibiotic susceptibility of the identified bacteria was determined by disc diffusion method and evaluated according to Clinical and Laboratory Standards Institute (CLSI) criteria. The susceptibility of *E.coli* isolates to amoxicillin/clavulanic acid, ampicillin, imipenem, levofloxacin, meropenem, nitrofurantoin, cefepime, cefotaxime, ciprofloxacin, trimethoprim-sulfamethoxazole were investigated. Statistical analyzes were performed with Excel.

Results

There are many studies on the antibiotic susceptibility of *Escherichia coli* strains.

As shown in Figures 1 and 2, the antibiotic resistance of *E.coli* strains has increased considerably over the years.

In this study, the distribution of urine cultures examined by gender is shown in Figure 3. It is noteworthy that 88% of the patients whose sample was requested were female. This is due to the fact

that women have more frequent urinary tract infections due to their biological susceptibility.

While all *E.coli* strains isolated in a study conducted between 2008-2012 were susceptible to imipenem, amoxicillin/clavulanic acid was 97.2%, nitrofurantoin 98%, trimethoprim/sulfamethoxazole 77%, and ampicillin 68% were among the lowest susceptible antibiotics [9]. In a study conducted at Selcuk University, the resistance status of *E.coli* strains was found to be 0.86%, meropenem and imipenem 0.86%, nitrofurantoin 7.82%, amoxicillin/clavulanic acid 59.13%, ampicillin 94.78%, levofloxacin 26.8%, ciprofloxacin 36.3% [10].

In this study, the resistance rates of isolated *E.coli* strains were determined as follows: amoxicillin/clavulanic acid 26%, ampicillin 65%, imipenem 0.39%, levofloxacin 7%, meropenem 0.39%, nitrofurantoin 2%, cefepime 2%, cefotaxime 28%, ciprofloxacin 21% and trimethoprim sulfamethoxazole 39% (Table 1). Although these rates vary according to factors such as country and region, they are similar to the results of the studies conducted in our country [11, 12].

Conclusions and Recommendations

Considering imipenem and meropenem resistance; We can state that carbapenem groups are effective in clinical use in the treatment of infections caused by *E.coli* in Turkey. However, in order to prevent the development of resistance to this group of antibiotics, particular attention should be paid to its use in empirical treatments. It should not be forgotten that the antimicrobial susceptibility profiles of *Escherichia coli* isolates may differ depending on the hospital, year, region and nosocomial origin or social origin

Figure 1. Ciprofloxacin resistance by years [9, 10].

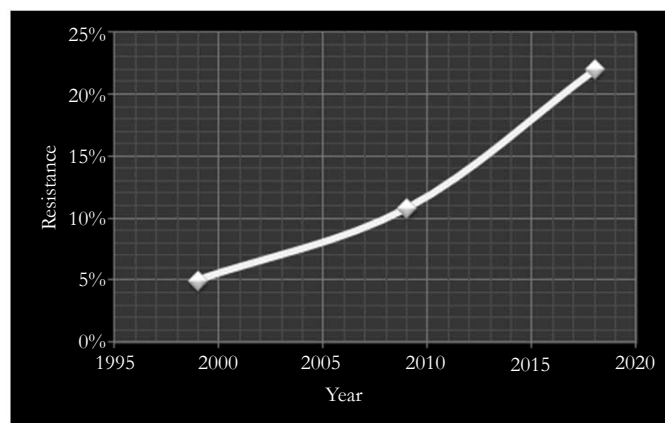


Figure 2. Trimetoprim/sulfamethoxazole resistance over years [11].

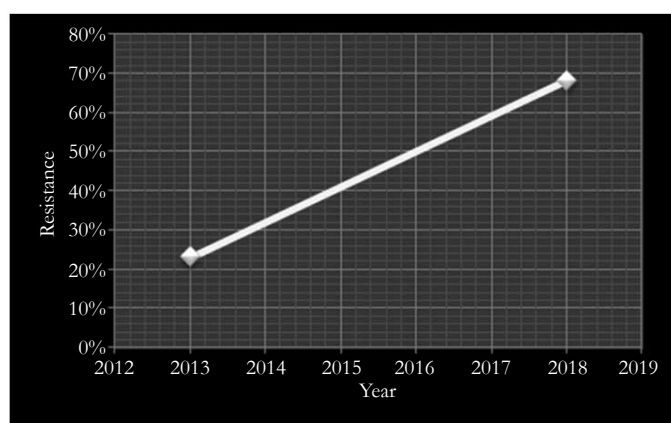
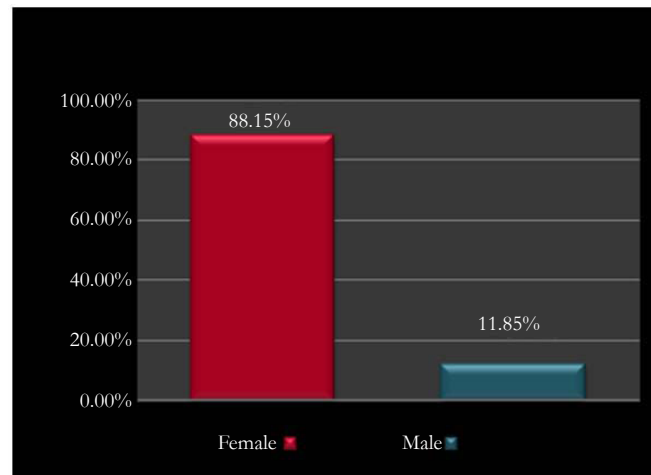


Figure 3. Distribution of urine cultures by gender.**Table 1 : *E.coli* isolates according to the number of samples.**

Antibiotics	Resistant	Medium Sensitive	Sensitive
Amoxicillin-Clavulanic acid	66	33	155
Ampicillin	164	9	81
İmipenem	1	4	249
Levofloxacin	52	4	197
Nitrofurantoin	4	6	244
Meropenem	1	1	252
Cefepime	5	23	225
Cefotaxime	71	10	173
Ciprofloxacin	54	2	195
Trimethoprim-Sulfamethoxazole	99	2	153

of the study and the resistance rates should be determined by the studies to be performed in hospitals each year.

References

- [1]. Vahaboglu H. The problem of resistance in antibiotics. *Tur Clin Pharmacol Spl.* 200;2:92-96.
- [2]. Toreci K. The relationship between antibiotic use and resistance. *Flora*, 2003;8(2):89-110.
- [3]. Gold HS, Moellering Jr RC. Antimicrobial-drug resistance. *The N Engl J.* 1996 Nov 7;335(19):1445-53.
- [4]. Archibald L, Phillips L, Monnet D, McGowan JE, Tenover F, Gaynes R. Antimicrobial resistance in isolates from inpatients and outpatients in the United States: Increasing importance of the intensive care unit. *Clin Infect Dis.* 1997 Feb;24(2):211-5. PMID:911419.
- [5]. Winn WC. *Koneman's color atlas and textbook of diagnostic microbiology.* Lippincott williams & wilkins; 2006.
- [6]. Edwards PR, Ewing WH. *Identification of enterobacteriaceae.* Identification of Enterobacteriaceae.. 1972(Third edition).
- [7]. Palaniappan RU, Zhang Y, Chiu D, Torres A, Debroy C, Whittam TS, et al. (2006). Differentiation of *Escherichia coli* pathotypes by oligonucleotide spotted array, *J Clin Microbiol.* 2006 Apr;44(4):1495-501. PMID:16597882.
- [8]. Johnson JR, Russo TA. Molecular epidemiology of extraintestinal pathogenic (uropathogenic) *Escherichia coli*, *Int J Med Microbiol.* 2005 Oct;295(6-7):383-404. PMID:16238015.
- [9]. French GL, Phillips I. Antimicrobial resistance in hospital flora and nosocomial infections. *Hospital epidemiology and infection control.* Baltimore: Williams and Wilkins. 1996.
- [10]. Yildirim M, Sahin I, Oksuz S, Ozdemir D, Guclu E. (). Resistance to some oral antibiotics in uropathogen *Escherichia coli* strains and risk factors associated with resistance. *Journal of Ankem.* 2009;23(1):1-7.
- [11]. Dogan M, Aydemir O, Feyzioglu B, Baykan M. (). Bacteria Isolated from Urine Specimens of Children and Antibiotic Susceptibility. *Journal of Ankem,* 2013;27(4):206-212.
- [12]. Al-Dulaimi DAA. Plasmid mediated fluoroquinolone resistance in *Escherichia coli* clinical isolates, M.Sc. Thesis, Selcuk University;2015: Institute of Health Sciences.

Submit your manuscript at
<https://www.enlivenarchive.org/online-submission.php>

New initiative of Enliven Archive

Apart from providing HTML, PDF versions; we also provide video version and deposit the videos in about 15 freely accessible social network sites that promote videos which in turn will aid in rapid circulation of articles published with us.