

EFFECT OF CEFOTAXIME ON ESCHERICHIA COLI ISOLATED FROM URINARY TRACT INFECTION**Maher Ali Abdul Hussein Shaaban**University Sumer-College of Science-Department of Pathological Analysis
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Abstract: This study aims to detect the effect of cefotaxime antibiotic on Escherichia coli bacteria isolated from urinary tract infections. 27 clinical samples were collected from the urine of women with urinary tract infections caused by Escherichia coli bacteria under the supervision of a specialist doctor at Al-Rifai General Hospital in Al-Rifai District / Dhi Qar Governorate. Escherichia coli bacteria have been diagnosed by conventional methods, which have confirmed infection with Escherichia coli.

A drug susceptibility test was conducted for bacterial isolates of E. coli to the antibiotic cefotaxime from 27 female patients believed to have UTIs.

The Statistical package for the social sciences (SPSS) system was adopted in this study for the purpose of statistical analysis, which express the negative or positive effect of the antibiotic cefotaxime on female patient samples, according to the target age groups. In the study.

If we conclude from the foregoing from the current study that the rate of resistance of E. coli bacteria to the antibiotic cefotaxime has reached 70%, and this is consistent with the study of researcher Harran (2012), which confirmed the high and large resistance of E. coli to the antibiotic cefotaxime of the group of third- generation antibiotics The cephalosporins group, and the rate of resistance to the previous antibiotic was 76.6%. The results of this study also coincided with the results of the researcher's study SURESH (2016) in India, where the percentage of E. coli resistance to the antibiotic cefotaxime was 100%. This study was also compatible with the researcher's study HEGAZY (2018), which demonstrated the resistance of E. coli isolates to the antibiotic cefotaxime by 74.4%, and the reason for the aforementioned results of the current study and studies compatible with it is due to the ability of E. coli to resist the antibiotic cefotaxime due to its possession of efficient flow pumps in the elimination

of the antibiotic. The previous bio outside the cell and the removal of the effect of this antibiotic, and thus the existence of the natural efflux pumps outside the cell (Efflux pumps), and perhaps one of the most important efflux systems possessed by *E. coli* is the AcrAB-TolC system of the RND family, which is the most common efflux system in *E. coli*, through which you can change the permeability of the outer membrane of the germ cell.

E. coli bacteria have many mechanisms to resist beta-lactam antibiotics, as they work to produce beta-lactamase enzymes stationed in the periplasmic vacuole, and these enzymes attack beta-lactam antibiotics before they reach the target, and the bacterial cell works to reduce its permeability to prevent the entry of

antibiotics and thus inhibit their action, and it is possible. The bacterial cell acts as a pump driving the antibiotic beyond its borders, but the most common mechanism is its production of beta-lactamase enzymes and its importance comes through its ability to open the beta-lactam ring for both penicillins and cephalosporins (Frere et al., 2015; Bush, 2015; Chambers et al., 2005).

Several studies indicate that if *E. coli* bacteria show resistance to ceftriaxone, ceftazidime, azotronam, and cefotaxime, they are considered broad-spectrum to resist many beta-lactams (penicillins, cephalosporins, and monobactams) due to the production of extended spectrum β -lactamases (ESBLs).] making the treatment menu for patients with UTIs limited

Keywords: -.



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Introduction

Escherichia coli is a member of the enterobacteriaceae family that is negative for the dye Cram, Bacillus form, mobile or non-motile aerobic or anaerobic optional facultative anaerobic fermented lactose sugar and mostly fermented for ramnose sugar and sorbetole sugar producing the enzyme glucoronidase - the optimum temperature for their growth (36-37) C (2017,. Wanger et al 2016,. Jawetz et al.), catalase and oxidase negative for indole and non-citrate citrate, positive for methyl red and negative for Vogase-Proskauer (2013).

They live naturally in the intestines of humans and animals, and at the same time they are opportunistic pathogens that cause many diseases such as diarrhea, meningitis, sepsis, bacteremia, and it is one of the most common bacterial types that cause

Urinary tract infections are common, as they cause about (90%) of urinary tract infections in the world, and are more common in childhood

)Hadi\ et\ al, 2016 –\ Shuwaikh\ and\ Jassim(

The pathogenicity of these bacteria is due to the possession of many virulence factors, and these factors are the possession of iron chelates serophores toxic necrotizing factor colisin cytotoxic necrotizing factor and their possession of surface structures such as flagella, capsule and polysaccharides.

Lipopolysaccharides (PS), which endow antigen traits by producing antigen flagellar antigen (HH), somatic antigen O (O) somatic antigen and capsular antigen

K. It also has cilia (fimbriae or pili) that help it adhere to the host tissues, giving it the ability to form a biofilm

. (Terlizz et al., 2017; Zowawi et al., 2015)

It is characterized by coli bacteria. It has the characteristic of multidrug resistance (Lair, 2016) Resistance (MDR). It is characterized by its high resistance to antibiotics due to the possession of resistance enzymes such as beta-lactamases that provide resistance to beta-lactam anti-blacams, and enzymes that give resistance to aminoglycosides and quinolones anti-quinolones . . These bacteria also have other mechanisms that give them antibiotic resistance such as alteration of cell membrane permeability, change in target site, inhibition of protein

synthesis and bacteria possession of efflux pumps as they give antibiotic-resistant bacteria such as macrolides, novobiocin antagonists and Kapoor et al, (2017) rifamicn). The flow pumps are divided into five families: Major Facilitator Super Family (MFS), Small Multidrug Family (SMR), Multidrug and Toxic Efflux Family (MATE), ATP-Binding Cassete Family (ABC) and Resistance - Nodulation - RND Division Family, including the system (ACTAB-TIC), which is more common in E. coli bacteria. It consists of three proteins: the inner membrane protein AcrB, which encodes the acrB gene , the proteins circulating in the AA plasma space, which encodes the acrA gene, as well as the ToIC channel, which is located in the outer membrane (2015,. Anes et al)

Due to the importance of E.coli bacteria and their relationship to urinary tract injuries and their resistance to antibiotics, this study came to reveal the flow systems possessed by E. coli bacteria. Isolated from tract injuries

Urinary and its relationship to antibiotic resistance according to the following study axes:

- 1- Isolation and diagnosis of E. coli. bacteria from the urine of patients with urinary tract infections by transplantation, biochemical and molecular methods using the diagnostic gene 16SrRNA.
- 2- Conducting a sensitivity test for different groups of antibiotics 3- Conducting a test for the ability of bacteria to produce biofilm . 4- Phenotype detection of efflux pumps
- 3- Genotype molecular detection of acrA and acrB flow pump genes using PCR technology.
- 4- Conducting sequential analysis of DNA sequencing of the diagnostic gene 1657RNA and the resistance genes acra and acrB

Methods

1. Instruments and Equipments

The instruments and equipment were used in this study are listed in the Table (2- 1):

Table (2-1):- Instruments and equipment used and their origin

No.	Instruments & Equipment	Company/ Origin
1	Autoclave	Monarch MSI /Germany
2	water bath	Tafesa-hannover (Germany)
3	Refrigerator	Concord (Lebanon)

4	Centrifuge	Hettich, (Germany)
5	Light Microscope	Olympus/Japan
6	Incubator	Binder (Germany)
7	Micropipettes	CYAN/ Belgium
8	Microwave electric oven	Elekta (Japan)
9	Benson burner	Membrane/Germany
10	Sensitive electronic balance	Denver instrument (Germany)
11	Sterilized cotton swabs	Sterile EO. / China
12	Disposable syringe 3m	Sterile EO. / China
13	Tips	Sterellin Ltd. / UK
14	Disposable Petri dishes	Al-Hani company / Lebenon
15	Eppendorf tubes	Sterellin Ltd. / UK
16	Vortex	CYAN/ Belgium

2. Culture Media used in this study

The culture media were used for bacterial isolation in this study are listed in Table (2-2).

Table (2-2):- Culture Media and manufacturer.

Medium	Manufacture
MacConky agar	Himedia(India)
Blood-base agar	Himedia(India)
Muller – Hinton agar	Himedia (India)
Brain heart agar	Himedia (India)
Sabourauds Dextrose Agar	Himedia(India)
Brain-heart infusion broth (BHIB)	Himedia(India)

Manitol salt agar	Himedia(India)
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3. Kits

Kits were used for biochemical test and Molecular methods are listed in Table (2-3).

Table (2-3):- Types of kits used in the present study and their origin .

Kit	Company/Origin
Gram' stain	SyrBio(Syria)
API 20E test	BioMerieux (France)
API20 Staph	BioMerieux (France)
Genomic DNA extraction kit	Anatolia(Turkisk)

4. Antibiotic Disks

The antibiotic discs (Bioanalyse ,Turkey) that are used in this study are listed in Table (2-4).

Table (2-4): antibiotics disk used in the study Antibiotic

Antibiotic Name	Symbol	Conc. \mg
Cefotaxime	CTX	30

Testing for antibiotic susceptibility

All bacterial isolates were subjected to antibiotic susceptibility depended on disc diffusion-method as described by Bauer et al., 1966. The selection of antibiotic disc was done according to the guidelines recommended by the Clinical and Laboratory Standard (CLSI, 2018). The colonies were inoculated onto Mueller- Hinton agar plates by dipping a sterile swab into the inoculums. The swab was streaking over the surface of the medium several times with the plate was rotated through an angle of 60°,to ensure diffusion after each application finally, also the swab was pressed around the edge. Antibiotic disk was placed to each plate by sterile forceps, approximately 15 mm far of the edge of the plate. Each disc gently pressed down to ensure even attached with the medium. The plates were put in incubator at 37°C. After 18 or 24 hours incubation, the diameter present each zone (including the diameter of the disc) were measured with a pair of calipers the recorded in mm ,the results then explain according to(CLSI,2018) .

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Statistical Analysis :

A drug susceptibility test was conducted for bacterial isolates of E. coli to the antibiotic cefotaxime from 27 female patients believed to have UTIs.

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Table(1): Shows The Drug Susceptibility Test For Bacterial Isolates Of E. Coli To The Antibiotic Cefotaxime From 27 Female Patients, According To Age Groups, Who Are Believed To Have Utis.

No	Name	Age	S or R
1	هند محسن عبد	25	No
2	هدى حميد ناصر	30	No
3	هيلا جبر مصيف	75	No
4	نرة كاظم جودة	52	No
5	زينب علي منخي	7	YES
6	نرجس مؤيد جبار	7	No
7	خديجة تسلال جاسم	25	YES
8	شفافة سوكان محمد	75	No
9	هدية شاهين سعدون	55	No
10	سريفة عصب حسين	65	No
11	زهراء يونس ناصر	20	No
12	صدريه عباس لقمان	72	No
13	رحمة راشد ظاهر	1	YES

14	فاطمة نادر عبا	20	No
15	انتظار سلمان	24	YES
16	حنان علي محسن	5	YES
17	نرجس منظر جابر	15	No
18	منتهى عبد الرزاق طاهر	26	No
19	هديل جلال عبد	21	No
20	ساجدة فرحان فزاع	45	No
21	نرجس علي محمد	12	YES
21	سناء جوعان جسام	27	No
23	رقية سجاد ناصر	7	No
24	رقية صالح عباس	10	YES
25	ريام خير هلال علي	28	No
26	صفية جابر وهج	51	YES
27	أسماء خليل يونس	22	No

Results and Discussion

It was observed from Figure (1) that 70% of the female patients did not prove the efficacy of the antibiotic cefotaxime on E. coli, and the bacterium

E. coli was able to resist the antibiotic, while 30% of the females showed that the antibiotic cefotaxime was effective for them. In inhibiting the growth of Escherichia coli bacteria in her urine samples

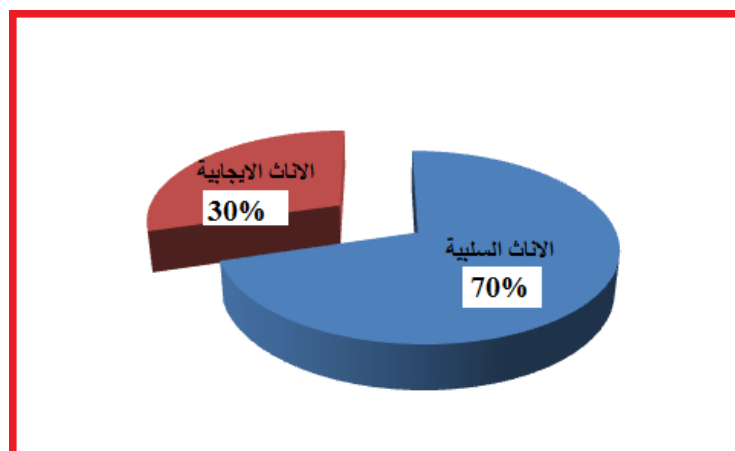


Figure (1): Percentage of the effectiveness of the antibiotic cefotaxime against E. coli, in urine samples of female patients.

It was also shown through Figure (2) and Figure (3) that the most age groups of female patients in whom the E. coli bacteria were able to resist the antibiotic cefotaxime are (22-12), (22-30), while the age group was (1- 12) is the most age group of females in which the antibiotic cefotaxime has proven effective in inhibiting the growth of E. coli germs, while the age group (55-75) was the only group that did not show any effectiveness of the antibiotic cefotaxime on E. coli germs E. coli was able to resist the antibiotic.

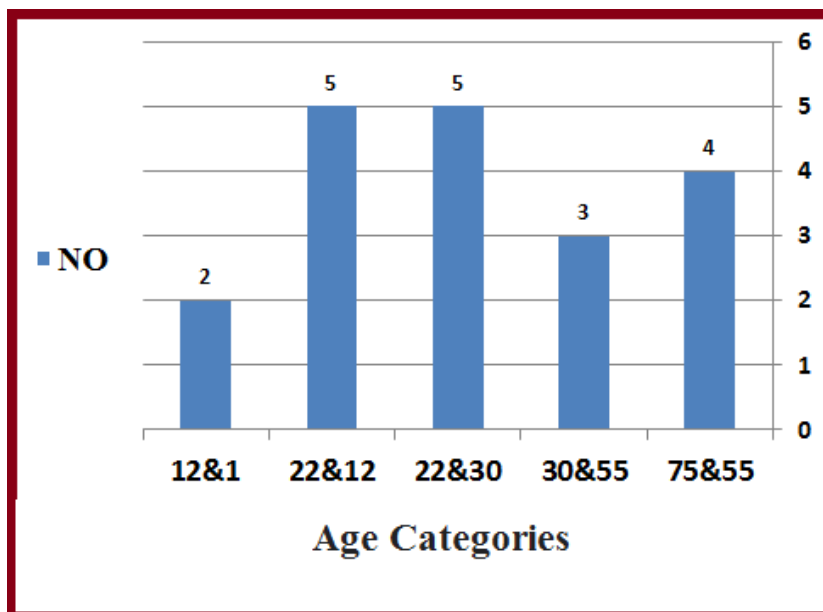


Figure (2): Age groups of females who did not have the antibiotic cefotaxime effective against Escherichia coli.

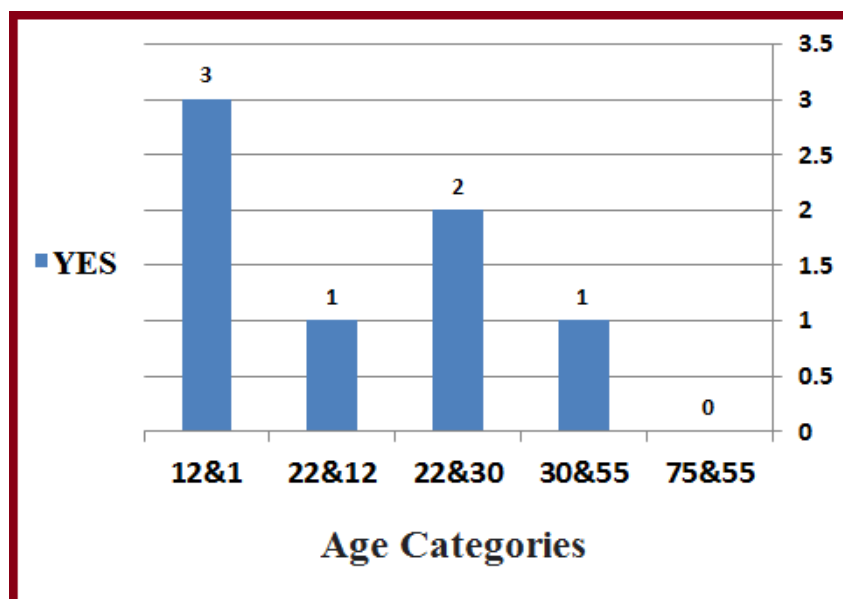


Figure (3): The effectiveness of the antibiotic cefotaxime against Escherichia coli according to the age groups of females.

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Several studies indicate that if *E. coli* bacteria show resistance to ceftriaxone, ceftazidime, azotronam, and cefotaxime, they are considered broad-spectrum to resist many beta-lactams (penicillins, cephalosporins, and monobactams) due to the production of extended spectrum β - lactamases (ESBLs).] making the treatment menu for patients with UTIs limited.

On the other hand, one of the causes of *E. coli* resistance to beta-lactam antibiotics, including cefotaxime, is due to the production of beta- lactamase enzymes, including Cephalosporinase, which work to destroy the beta-lactam ring and inhibit the action of the antibiotic and remove its effect from the cell by modifying the permeability of the bacterial membrane.

Based on the results of the current study and based on the studies compatible with it, the majority of *E. coli* isolates have multiple and strong resistance to the antibiotic cefotaxime because of their efflux systems, which they use to destroy the b-butalactam ring and inhibit the action of antibiotics.

The results in the current study are encouraging for the presence of many effective effects of many antibiotics, despite the existence of high levels of resistance to some other antibiotics. Include them according to the standards of patients known to them, because they are not patients in hospital, as the conditions worsen in patients who are hospitalized.

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