

Original Research Article

The Study of Multidrug Resistance against Antibiotics in *E. Coli* Bacteria Causing (UTI) in Women in the Kirkuk City

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Abstract: Examination using susceptibility tests of 112 urine sample revealed that the *Escherichia coli* is the mostly causative agent of women urinary tract infections in Kirkuk city. the high resistance rate %82.2 of *E.coli* was found to be against Clindamycin, where as other 32 bacterial isolation were exhibited multidrug resistant to 5 antibiotics used in this study . and lowest number of multidrug resistant isolates nine in total is resistance to six anti biotic .and all isolation were sensitive to Imipenem.

Keywords: Antibiotic, Multidrug resistance, *E.coli*, Kirkuk.

INTRODUCTION

Urinary tract infection (UTI) are more common in women than in men, although, numerous bacteria such as *Staphylococcus saprophyticus*, *Klebsiella*, *E.coli* , *Proteus*, *Pseudomonas aeruginosa*, and *Enterococcus* are considered to be the causative agents of (UTI) .Among these, *E.coli* is commensalism bacteria lives in human intestine and it seizes every opportunity to cause various diseases such as (UTI), diarrhea and bacteremia. *E.coli* was shown to developed resistant to wide variety of antibiotics which encoded by genes located on the chromosomal DNA or plasmids , which in tum leading to the spread of multidrug resistance. The isolation and identification of *E.coli* from women UTI was aim of the investigation with the studying the multidrug resistance against several antibiotics [1-6].

MATERIALS AND METHODS

This study was conducted from February to September 2022, and the urine samples were aseptically obtained from 122 women under the age of 20 to 70 years. these individuals complained of acute and chronic urinary tract infections. Different culture media such as blood agar, Nutrient agar, and MacConkey agar were used for culturing and identification of bacteria that are exhibited in the urine samples.

Isolation and identification

The bacterial isolates were differentiated using cultured growth, microscopical examination and was also used for culturing and identification of *E.coli* isolates. On the other band, the API 20E system was used to confirm the identification of the bacterial isolates [7, 8].

Antibiotic Susceptibility and Resistance Testing

Nine different antibiotics were used in this study, as shown in Table (1). The Kirby-Bauer disk diffusion method was employed to test the susceptibility of bacterial isolates to these antibiotics. This method involves the diffusion of antibiotics on a solid medium, and the results were interpreted by measuring the diameter of the inhibition zones [9, 10].

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Table 1: Antibiotics used in this study

ت	Code	Antibiotic	Concentration of antibiotics	Name of the manufacturing company
1	AK 30	Amikacin	30 mcg	Bioanalyse
2	CN 10	Gentamicin	10 mcg	Bioanalyse
3	DA 10	Clindamycin	10 mcg	Bioanalyse
4	NA 30	Nalidixic acid	30 mcg	Bioanalyse
5	TE 10	Tetracycline	10 mcg	Bioanalyse
6	IPM 10	Imipenem	10 mcg	Bioanalyse
7	LE 5	Levofloxacin	5 mcg	Bioanalyse
8	F 100	Nitrofurantoin	100 mcg	Bioanalyse
9	CIP 10	Ciprofloxacin	10 mcg	Bioanalyse

RESULTS AND DISCUSSION

This study revealed that 79 out of 112 urine samples (70.5%) contained *E.coli*, while the remaining 33 samples (29.5%) were found to contain other species of bacteria that cause urinary tract infections, as shown in Table (2). The study focused on investigating the multidrug resistance of *E.coli* bacteria due to the high prevalence of *E.coli* infections in urinary tract infections. Other bacterial types causing UTIs in women were not included in the multidrug resistance analysis in this study.

Table 2: Species of bacteria in this study

	Bacteria	NO.	%
1	<i>E.coli</i>	79	70.5
2	<i>Klebsiella</i>	8	7.1
3	<i>Staphylococcus saprophyticus</i>	7	6.2
4	<i>Proteus</i>	7	6.2
5	<i>Pseudomonas aeruginosa</i>	6	5.5
6	<i>Enterococcus</i>	5	4.5
	Total	112	100

The results of this study demonstrated varying degrees of multidrug resistance among the *E. coli* isolates. Specifically, 11 isolates were resistant to a single antibiotic, 15 isolates were resistant to two antibiotics, 9 isolates showed resistance to three antibiotics, and 14 isolates were resistant to four antibiotics. Notably, the highest number of resistant isolates 23 in total exhibited resistance to five antibiotics. Additionally, 9 isolates were resistant to six antibiotics. On the other hand, 3 isolates were found to be sensitive to all antibiotics used in this study, as shown in Table (3).

Table 3: Numbers of multi drug resistant *E.coli*

No. antibiotics	No. of resistant strain	No. of each resistant antibiotic	Resistant antibiotic
1	11	7	DA
		3	TE
		1	NA
2	10	4	DA, TE
		2	DA, NA
		1	DA, AK
		1	NA, CIP
		1	AK, NA
		1	AK, F
3	9	3	DA, TE, NA
		2	DA, NA, F
		1	DA, TE, CIP
		1	DA, NA, CN
		1	AK, TE, NA
		1	LE, NA, CIP
4	14	3	DA, TE, NA, CIP
		2	DA, TE, LE, NA
		2	DA, NA, CN, CIP
		2	DA, NA, AK, CN
		1	DA, TE, LE, CIP
		1	DA, TE, CN, CIP

No. antibiotics	No. of resistant strain	No. of each resistant antibiotic	Resistant antibiotic
		1	DA, TE, NA, F
		1	TE, LE, NA, CIP
		1	TE, NA, CN, AK
5	23	9	DA, TE, LE, NA, CIP
		3	DA, TE, NA, CN, AK
		3	DA, TE, LE, NA, CIP
		2	DA, TE, LE, NA, CN
		2	DA, LE, NA, AK, CIP
		2	DA, TE, NA, CN, CIP
		1	DA, TE, NA, CN, F
		1	DA, TE, LE, NA, F
6	9	5	DA, TE, LE, NA, CN, CIP
		4	DA, TE, NA, CN, CIP, AK

Note: Three isolation were sensitive to all antibiotics used in this study

The results also showed that the *E. coli* isolates exhibited the highest resistance against Clindamycin, with a resistance rate of 65 isolates (82.2%). This was followed by Nalidixic acid, with a resistance rate of 56 isolates (70.8%), and then Tetracycline, with 52 isolates (65.8%). For Ciprofloxacin, the resistance rate was 36 isolates (45.5%), which is similar to the findings of another study [11]. The resistance to Levofloxacin was 27 isolates (34.1%), and for Gentamicin, it was 24 isolates (30.3%), a rate comparable to that in another study [12]. Resistance to Amikacin was observed in 16 isolates (20.2%).

The lowest resistance rate among the antibiotics used in this study was found with Nitrofurantoin, with only 6 isolates (7.5%) showing resistance, which differs from the findings of study [11]. All isolates were sensitive to Imipenem, with a 0% resistance rate, consistent with the results of study [13]. Additionally, three isolates were found to be sensitive to all the antibiotics used in this study, as shown in Table (4).

The study suggests that the widespread and random use of antibiotics by patients, often without consulting a specialized physician, has contributed to the development of bacterial resistance to antibiotics. Imipenem, on the other hand, is a relatively new antibiotic from a new generation, and its resistance is not yet widespread due to its recent introduction and limited use by patients.

Table 4: Percentage of resistant *E.coli* isolates to the antibiotics used in this study

	Antibiotic	NO.	%
1	Clindamycin	65	82.2
2	Nalidixic acid	56	70.8
3	Tetracycline	52	65.8
4	Ciprofloxacin	36	45.5
5	Levofloxacin	27	34.1
6	Gentamicin	24	30.3
7	Amikacin	16	20.2
8	Nitrofurantoin	6	7.5
9	Imipenem	0	0

CONCLUSION:

Escherichia coli was found to be the most causative agent for women urinary tract infection in Kerkuk city, Iraq.

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