

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Antibiotics Susceptibility Of Bacterial Isolates Isolated From Urinary Tract Infections In Iraq, Baghdad.

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### ABSTRACT

The present study was aimed to ascertain the **antimicrobial resistance** of pathogenic bacteria associated with urinary tract infections. *Escherichia coli* was found to be the most prevalent uropathogen (53.8%), followed by *Staphylococcus aureus* (23.0%), *Klebsiella* Spp. (12.3%), *Staphylococcus Saprophyticus* (9.6%) and *Proteus* Spp.(3.8%). Isolated bacteria were characterized for their sensitivity to commonly prescribed antibiotics, *E. coli* isolates, the predominant cause of UTIs, showed high resistance to amoxicillin, cefotaxim and gentamicin, but sensitive to ciprofloxacin, and Sulfamethoxazole-trimethoprim; *Klebsiella* spp. and *Proteus* spp. displayed a similar resistance pattern as for *E. coli* and showed high susceptibility to cefotaxim, Sulfamethoxazole-trimethoprim and ciprofloxacin. *S. aureus* showed susceptibility to cefotaxim and gentamicin, while *S. saprophyticus* amoxicillin, cefotaxim, gentamicin and ciprofloxacin.

**Keywords:** uti, *E. coli*, antibiotics, resistance.

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## INTRODUCTION

Urinary tract infection (UTI) is the most common bacterial infectious disease in community practice, with a high rate of morbidity and financial cost, it affects people of all ages, from neonates to the geriatric age group [1]. An infection anywhere in the urinary tract is called a UTI. The infection may be in the urethra (urethritis), bladder (cystitis), or kidneys (pyelonephritis) [2]. Women are more susceptible to urinary tract infections, as stated earlier, because of the proximity to the anus but also because their urethra is shorter than males, which allows an easier passage for bacteria to get up into the bladder [3]. Bacteria is the most common cause of these infections but other microbes, including fungus, parasites, and protozoa, also cause urinary tract infections [4]. *Escherichia coli* is the most common cause of UTI in women and children followed by a number of gram-positive cocci and other Enterobacteriaceae [5], [6]. Fimbriae are structures (similar to arms or hundreds of sticky hairs) on the surface of bacterial cells that adhere to each other or other surfaces, including the cells inside of the urinary tract. Another possible reason that people with diabetes may be more susceptible to urinary tract infections is because of issues with eliminating the entire amount of their bladder, causing retention of bacteria contaminated urine [7]. With the help of a biofilm, bacteria are able to share nutrients and protect themselves as a whole group, not as individuals. This is especially important when looking at treatment for bacteria [4]. Antibiotic resistance has been increasing recently, and its seriousness is a global problem [8]. Increasing resistance has become the main concern due to misuse of antibiotics. Antibiotic resistance is a key threat to public health; good prescribing practice is essential to reduce the spread of resistance. The aims of antibiotic prescribing should be to ensure treatment is effective [9].

## MATERIALS AND METHODS

### Specimen Collection and Bacterial Isolates

This study was conducted from November 2017 to June 2018 patients with clinical symptoms of UTI referred Clean catch midstream urine samples (MSU) were collected in sterile disposable containers (4-5 ml) and transported immediately to the laboratory. Urine specimens were subjected to general urine examinations. Urine samples were cultured on 5% blood agar, MacConkey, and Eosin-Methylene blue (EMB) agar (Oxoid Ltd, Basingstoke, Hampshire, UK) and incubated in aerobic conditions for 24 hours at 37°C. Samples with colony count equal or more than  $10^5$  CFU/ml were considered positive. The isolates were identified and confirmed using standard microbiological methods including Gram staining, colonial morphology on media, growth on selective media, lactose and mannitol fermentation, catalase, oxidase, coagulase, indole, and citrate utilization, and urease test.

### Antimicrobial Susceptibility testing:

Antimicrobial susceptibility testing was performed on Mueller-Hinton agar (Merck, Germany) using disk diffusion (Kirby Bauer's) technique according to Clinical and Laboratory Standards Institute (CLSI) guidelines. The antibiotic discs and their concentrations consisted of Cefotaxime (CTX, 30µg, Polfa, Tarchomin, Poland), Imipenem (IPM, 10µg, Zeneca, Macclesfield, UK), Ciprofloxacin (CP, 5µg), Gentamicin (GM, 10µg), Amoxicillin (AX, 10µg), Trimethoprim-sulfamethoxazole (SXT, 30µg).

## RESULTS

In this study, 130 (14.4%) out of 900 patients showed positive urine cultures of which there were 110 (84.6%) females and 20 (15.3%) males. 91 (70%) cases of the isolated bacteria were Gram negative bacilli while 39 (30%) cases were Gram positive cocci. The frequency of isolated microorganisms and their relations to sex is given in Table 1.

**Table (1): Frequency of Bacterial isolates Isolated From Urine Specimens and Their Relation to Sex in This Table**

Isolated Bacteria	No.(%)	Female,No(%)	Male,No(%)
Escherichia coli	70(53.8)	58(82.8)	12(17.1)
Klebsiella spp.	16(12.3)	14(87.5)	2(12.5)
Proteus spp.	5(3.8)	4(80)	1(20)
Staphylococcus aureus	30(23.0)	26(86.6)	4(13.3)
Staphylococcus saprophyticus	9(9.6)	8(88.8)	1(11.1)
<b>Total</b>	<b>130(100)</b>	<b>110(84.6)</b>	<b>20(15.3)</b>

E. coli was the most common microorganism isolated in all age-groups and both sex ,the isolation percentages of bacterial species were found as E. coli (53.8%);S.aureus (23.0%); Klebsiella spp. (12.3%); S. saprophyticus (9.6%); Proteus spp. (3.8%), E. coli isolates,the predominant cause of UTIs, showed high resistance to amoxicillin ,cefotaxim and gentamicin, but sensitive to ciprofloxacin, and Sulfamethoxazole-trimethoprim ;Klebsiella spp. and Proteus spp. displayed a similar resistance pattern as for E. coli and showed high susceptibility to cefotaxim, Sulfamethoxazole-trimethoprim and ciprofloxacin.

S.aureus showed susceptibility to cefotaxim and gentamicin , while S.saprophyticus amoxicillin, cefotaxim, gentamicin and ciprofloxacin as shown in table(2).

**Table (2): Percentages (%) of Antimicrobial Resistance of bacterial isolates Isolated in this Study**

Antibiotic	E.coli	Klebsiella Spp.	Proteus Spp.	S.aureus	S.saprophyticus
AX	100	100	100	70	30
CTX	80	10	20	30	15
GM	75	80	75	40	40
SXT	58	16	13	90	70
CP	10	11	9	65	32

Abbreviations: AX, Amoxicillin ;CTX, cefotaxim; GM, Gentamicin ; SXT, Sulfamethoxazole-trimethoprim; CP, Ciprofloxacin.

### DISCUSSION

This study shows the distribution of microbial species isolated from patients with UTI at Baghdad hospitals, Iraq and their susceptibility pattern to antimicrobial agents. Furthermore, we described the relationship between sex and isolated bacterial agents of UTI. Microbial infection of the UTI is one of the most common infectious diseases worldwide ,approximately UTI remains very common. As many as 50% of women report having had at least one UTI in their lifetimes[10].Although men also are at risk, the frequency of UTI in women is an order of magnitude higher than that in men. Even among individuals at high risk of infection, such as catheterized patients, women have a higher risk of UTI than men[11].

Our study indicates that E. coli (53.8%), is still the most common cause of UTI in Iraq. This corresponds with the data obtained by other investigators [12]. In addition S.aureus(23.0%) was the most common cause of UTI among Gram positive bacteria. Recent studies have revealed the importance of coagulase negative S.saprophyticus(9.6%)[13].Our findings demonstrated that other Gram negative bacteria play an important role in UTI as 12.3% and 3.8 for Klebsiella spp. And proteus spp. Respectively. Antibiotics sensitivity test shows that Gram negative bacteria (E.coli , Klebsiella Spp. and Proteus Spp. had 100% of resistance to amoxicillin, while there were 70% of resistance for S.aureus and 30% for S.saprophyticus to this antibiotic.

Ciprofloxacin effected on both Gram positive and Gram negative in this study and as an option for remedy to UTIs has been considered since its multiple mechanisms of action seem to have enabled it to retain

potent activity against *E. coli*, Ciprofloxacin shows high level of activity against *E. coli* in UTI compared to other commonly used agents such as ampicillin and SXT [14]. Low resistance to this drug was observed because it was not easily available and are relatively expensive compared to others. Thus, this drug could be considered as alternative options in empirical treatment of UTIs [15].

*Klebsiella Spp.* and *Proteus Spp.* were sensitive to trimethoprim-sulphamethoxazole, while gentamicin effect on Gram positive bacteria in this study. A common problem surrounding the treatment of urinary tract infections is that they have been over diagnosed without the proper testing, leading to treatment with antibiotics for asymptomatic bacteria. When antibiotics are taken without having a specific bacteria to target it can kill the good microorganisms in our body which effects their ability to ward off the "bad" microorganisms. Furthermore, the actual bacteria you are targeting can become resistant to antibiotics and can change its cells surface so that the once effective antibiotics no longer are able to kill off the bacterial cell. This produces antibiotic resistant bacteria [16].

### CONCLUSION

*E. coli* was most frequently isolated bacteria in this study, females are commonly affected than men with *E. coli* being the most common uropathogen. Antibiotics such as amoxicillin and gentamicin has shown to have limited value and sensitivity to cefotaxim and ciprofloxacin.

### ACKNOWLEDGEMENT

This work was supported by Biology department, College of Science, University of Baghdad.

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