



Isolation and Identification of Pathogenic *Escherichia coli* from Different Sources in Najaf Hospital

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ABSTRACT

This study aimed to isolate and diagnose *Escherichia coli* from patients with urinary tract, wounds and burns and its antibiotic resistance pattern. 100 samples were collected from patients with urinary tract infections, wounds and burns for both sexes and different ages from different hospitals in the city of Najaf for the period from the twenty-seventh of July 2022 to the eleventh of December 2023, and after the diagnosis. Samples in the laboratory with selective media, in addition to compressed VITEK-2, and the results showed that the incidence of urinary tract infection was 91% for males and females, wounds 7% for males and females, and burns 2% for males, and the results showed that the percentage of isolates resistance to piperacillin was 64 %, amoxicillin-clavulanate resistance 63%, ceftriaxone resistance rate 43%, ceftazidime resistance 33%, trimethoprim-sulfamethoxazole resistance 29%, levofloxacin resistance rate 25%, doxycycline resistance rate 20%, aztreonam resistance rate 19%, cefoxitin had a resistance rate of 15%, gentamicin had a resistance rate of 5%, Imipenem had a resistance rate of 1%, amikacin had a resistance rate of 1%.

Keywords: *piperacillin* , *Imipenem* , *aztreonam* , *VITEK-2*

INTRODUCTION

Gram stain-negative bacilli, do not form spores, contain peripheral flagella that move through them, have smooth and convex colonies, mucous or non-mucoid when they have a capsule, have sharp edges, fermented for lactose when cultured on MacConkey medium with a bright pink color on this medium, either when Cultivated on Eosin Methylene Blue (EMB) medium, they have a green metallic sheen, It does not hydrolyze gelatin and does not produce H₂S gas in a medium of trisaccharide and iron, and grows at a temperature of 36-37 [1,2].

Escherichia coli naturally exist in the intestines of humans and animals and cause diseases such as genital tract infections, wound infections, urinary tract infections (UTI), and respiratory infections [3-5]. *Escherichia coli* bacteria have the potential to cause disease. These bacteria have many types and these types have many virulence factors through which they cause diseases. Urinary tract infection is the most common disease [6, 7]. There are strains of *Escherichia coli* that have genes at specific locations in pathogenic island ranging in size from 10 to 200 kb. These island that have the ability to overcome the immune system. Virulence factors include capsule,

lipopolysaccharides, adhesion, and enzymes [8,9].

The problem doctors face is the presence of antibiotic-resistant bacteria, due to abuse the antibiotics, and E. coli consider the most bacteria resistance antibiotics due to having different mechanisms to resist drugs [10, 11].

MATERIALS AND METHODS

A total of 100 sample from bacteria Escherichia coli sample isolated from urine, wounds, burns collected from several hospitals in city of Najaf included (Al-Sadr Teaching Hospital, Al-Najaf Teaching Hospital, Al-Hakim General Hospital Al-Furat Al-Awsat Hospital, Al-Zahra Teaching Hospital, Public Health Laboratory, Burns Center) collected from July2022 to December 2023. Samples were cultured on a MacConkey and Eosin Methylene Blue plates(EMB) and VITEK2 compact shown in figure 1.



FIGURE 1: Escherichia coli on Macconkey and EMBagar

Antimicrobial susceptibility

For 100 pathogenic Escherichia coli strains samples, susceptibility to 13 antimicrobial agents (piperacillin, Amoxicillin- Clavulanate, Ceftriaxone, Cefoxitin, Ceftazidime, Aztreonam, Imipenem, Gentamicin, Amikacin, Doxycycline, Ciprofloxacin, Levofloxacin, trimethoprim/sulfamethoxazole) by using Disk diffusion test.

RESULTS AND DISCUSSION

100 samples were collected from patients with UTI, wounds and burns The results indicated that the percentage of isolates in UTI were 91%, while wounds amounted to 7%, and burns amounted to 2% shown in figure2. The incidence of UTI, wounds and burns in female was 75%, while in males it was 25% shown in figure 3. In this study, it was shown that the infection rate of urinary tract infection among females was higher

than that of males, as the infection rate among females reached 71%, while males reached 20%, It agreed with a study where the infection rate was higher among females, reaching 66%, while males reached 34% [12-14]. The reason is due to the fact that the female urethra is structurally different, as it is less effective in preventing the entry of bacteria, meaning that the urethra is shorter and wider [8] . As for wounds, this study showed that the infection rate among females was higher than among males. The infection rate among females was 4%, while the percentage of males was 3%. This contradicted another study, where the infection rate among females was lower than that of males [15], due to external factors [16,17]. As for burns, the study showed that the infection rate for males was 2%, and it agreed with a study conducted in India, where the infection rate for males was higher than for females [18].

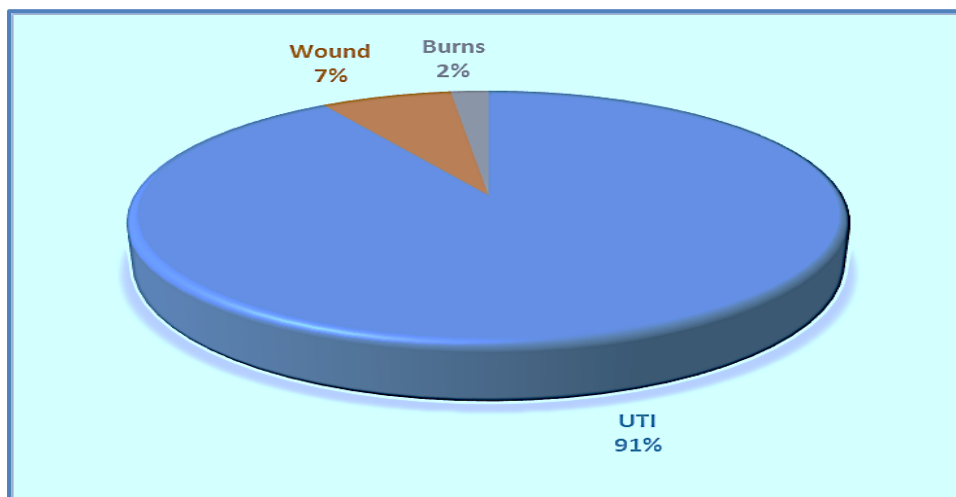


FIGURE 2 : E.coli isolated from UTI, wounds and burns

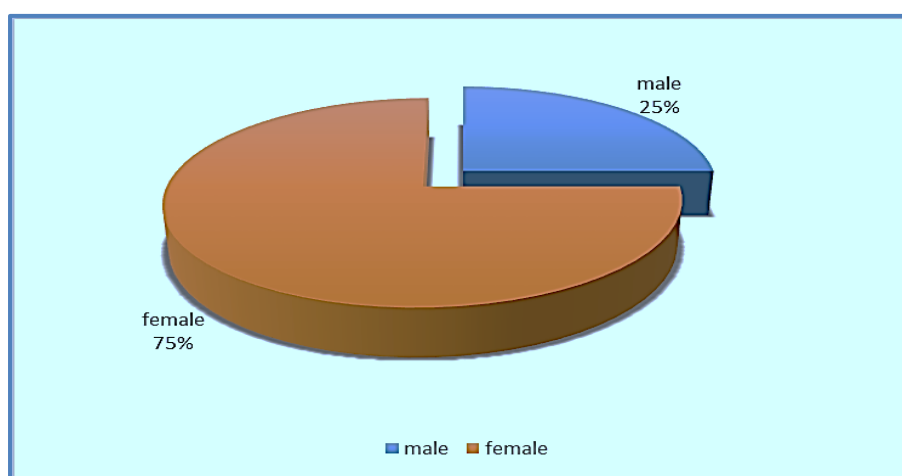


FIGURE 3: The proportion of Escherichia coli bacteria in males and females

The results of the current study showed the resistance of bacterial isolates to 13 different antibiotics shown in figure4. and the results of examining bacteria varied in their resistance to these antibiotics. The results in the current study showed that the isolates were resistant to piperacillin, where the percentage was 64%, and this result is consistent with another study conducted in Najaf [19, 20]. As for amoxicillin, this study showed a resistance of 63% and was not consistent with another study where the rate was 5.3%[15].The resistance rate to ceftriaxone in this study was 43%, and in another study, the resistance rate was 55.3%[21].The percentage of resistance to ceftazidime was 33%, and this result is consistent with another study, where it was 38.9%[22].The resistance rate to trimethoprim-

sulfamethoxazole was 29% and did agree with another study, where it was 21.7%[23]. Imipenem had a resistance rate of 1%, and its sensitivity was high, reaching 99%, and this result agreed with another study [24]. The efficiency of this antidote is due to the scarcity of its use in hospitals [25].amikacin The current study showed a weak resistance, amounting to 1%, and it was consistent with another study, where the sensitivity rate was high [26]. gentamicin, and the percentage of resistance in this study was 5%, and it agreed with another study, where it reached 28.2% [27] , The reason for the low resistance is that it has weak virulence factors that permeate the outer membrane and does not contain flow systems[28]. The percentage of resistance to aztreonam was 19%,

and it contrasted with another study, where it reached 100% [29-31]. Levofloxacin has a resistance rate of 25% in this study. Another study was conducted and the resistance rate was 62.5% [32, 33] . This study showed 20% resistance to doxycycline, while another study showed 100% resistance to Tetracyclin [34, 35].

While the percentage of resistance to ciprofloxacin was 34%, and it agreed with another study, where it was 56.25% [36, 37]. The current results found that the resistance rate to cefoxitin was 15% and agreed with another study, where it was 7% [38] .

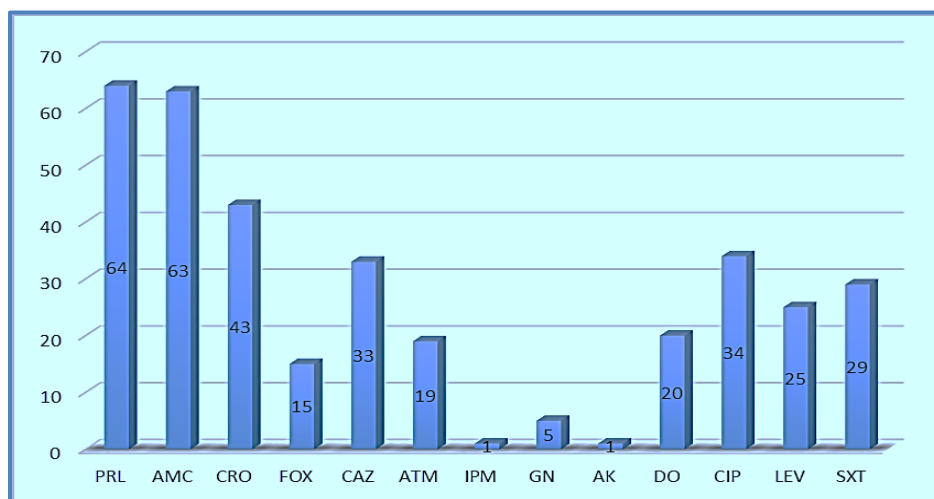


FIGURE 4: Antibiotic resistance rates for E. coli

CONCLUSION

The percentage of resistance to aztreonam was 19%, and it contrasted with another study, where it reached 100 % . Levofloxacin has a resistance rate of 25% in this study. Another study was conducted and the resistance rate was 62.5% . This study showed 20% resistance to doxycycline, while another study showed 100% resistance to Tetracyclin . While the percentage of resistance to ciprofloxacin was 34%, and it agreed with another study, where it was 56.25%.

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CONFLICT OF INTEREST

We do not have any conflicts of interest to declare

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Ethics Statement

None.

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