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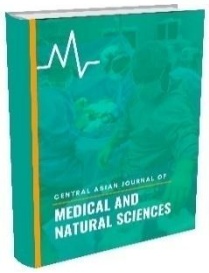

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FREQUENCY AND SENSITIVITY OF PROTEUS SPP, PSEUDOMONAS SPP, AND STAPHYLOCOCCUS SPP IN URINE CULTURES

1. **Intisar khlaif flaifel**[1]
2. **Ahmed Abdulkareem Ali**[2]
3. **Ruqayah Qubtan Taha**[3]
4. **Mohammad A. issa**[4]
5. **Osama A. mohsein**[5]
6. **Hamza A. Khalid**[6]

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[1] Al-Furat Al-Awsat University/ Babylon Technical Institutes/ Nursing Department
[2] University of Anbar, College of Education for Pure Sciences, Department of Biology
[3] University of Anbar/ College of Medicine
[4] Head of the Microbiology Division, Yatta Health Directorate, Ministry of Health – Palestine
[5] Mazaya university collage, Department of Medical Laboratory techniques

Abstract: Background; Urinary tract infections are common diseases, especially among women, and are caused by various types of bacteria, such as Proteus spp, Pseudomonas spp, and Staphylococcus spp. Study the extent of the spread of this bacterium in samples taken from patients in Thi-Qar Governorate plays an important role in knowing the causes of infection and methods of treatment for the purpose of reducing the incidence of infection and disease. There are various risk factors that can lead to the occurrence of urinary tract infections, such as the use of catheters, a lack of personal hygiene, or excessive use of antibiotics without consulting a doctor, which leads to antibiotic resistance problems in the future. Aims of the study: Providing healthcare and medical professionals with information about the spread of bacteria and the causes of therapeutic resistance in order to guide the most effective antibiotic treatment. Methodology: A retrospective study was conducted from April 10, 2023, to October 6, 2023, and a total of one thousand urine samples were collected. The samples were distributed equitably, with 500 urine samples collected for males and 500 urine samples collected for females. Age, nutritional status, and antibiotic usage were recorded without seeking medical consultation. The aforementioned samples underwent culture on blood agar

[5] Thi-Qar Health Directorate, Al Habbobi Teaching Hospital
[6] Mazaya university collage, Department of Medical Laboratory techniques
Corresponding author: Intisar khlaif flaifel, Al-Furat Al-Awsat University/ Babylon Technical Institutes/ Nursing Department, entsarflaifel8080@gmail.com

and MacConkey agar. Various chemical tests were employed to identify and isolate bacteria, in addition to conducting a drug sensitivity test. utilizing an assortment of antibiotics under sterile conditions in the laboratory of Al-Habbobi Teaching Hospital. Results: The result show the Frequency and Percent of Pseudomonas Spp was Hight than Proteus spp and Staphylococcus spp. The frequency of AK was (173.0) was the higher Frequency among others antibiotics, And The frequency of AMS was (46.0), So the frequency of ATM was (44.0). And the result shows the frequency of AZM, CN, CRO, IMP, LEV and MEM was (41.0), CAZ, CTX, E, FBE (47.0), CIP, F (46.0), DO (62.0), FOX (87.0) and PRL (62.0). The result show the frequency of Pseudomonas Spp was higher in female than male (300.0 vs 200.0) respectively. While the frequency of Proteus spp and Staphylococcus spp was higher in male than female (150.0 vs 100.0). The frequency of AK was higher in male than female (89.0 vs 84.0). And the Frequency of AMS and F was 24.0 in female and 22.0 in male. And the frequency of ATM was equal in male and female (22.0). And the Frequency of AZM, CN, CRO, IMP, LEV and MEM was higher in male than female (21.0 vs 20.0). The result shows the frequency of CAZ, CTX, E and FEP was higher in female than male (24.0 vs 23.0), While CIP was similar in frequency in male and female (22.0). The frequency of DO and PRL was 32.0 in female and 30.0 in male. While the frequency of FOX was higher in male than female (44.0 vs 43.0). Conclusions: The results showed that the frequency of Pseudomonas ssp. was 500 (50%) and the frequency of Proteus spp. and Staphylococcus spp. was 250 (25.0%) for a total of 1000 urine samples. The results also showed that the frequency of amikacin (AK) was the highest among all antibiotics, followed by Fox at a percentage of 7.8%. The statistical results also showed that the frequency of Pseudomonas spp. was higher in women compared to men. On the contrary, the frequency of Proteus spp. and Staphylococcus spp. was higher in men than in women. When comparing drug sensitivity in men and women, the

results showed that the frequency of amikacin (AK) and FOX in men is higher than in women.

Key words: antibiotic, Sensitivity, bacilli, Urinary tract infections (UTIs).

Introduction

Proteus belongs to the Enterobacteriaceae family of bacilli, characterized by its gram-negative nature and facultative anaerobic metabolism. It has the capacity to ferment maltose while lacking the ability to ferment lactose. P. mirabilis exhibits swarming motility, as well as the capacity to undergo self-elongation and produce a polysaccharide upon contact with solid surfaces [1].

Proteus is responsible for urinary tract infections, particularly in women who have diabetes, and can result in cystitis, which is frequently without symptoms. Proteus is a common cause of urinary tract infections in males, and in severe cases, it can progress to septicemia, which can be fatal. Hence, Proteus is regarded as a highly perilous bacterium that induces inflammation as a result of its virulent nature [2].

Pseudomonas aeruginosa is a gram-negative bacterium that exhibits aerobic metabolism and lacks the ability to generate spores. Both persons with robust immune systems and those with compromised immune systems are susceptible to illness caused by this rod-shaped bacterium. The organism's exceptional flexibility, resistance to drugs, propensity to infect persons with compromised immune systems, and diverse array of defense mechanisms make it exceedingly challenging to control in contemporary medical treatment [3,4].

Patients with compromised immune systems, including those with AIDS, cancer, cystic fibrosis, bronchiectasis, neutropenia, burns, organ transplants, uncontrolled diabetes mellitus, and admissions to critical care units, are at high risk of contracting pseudomonas infections. Individuals who own invasive medical devices, such as indwelling catheters or endotracheal tubes, are also susceptible to the risk posed by the organism's distinctive capacity to generate biofilms that are challenging to identify [4].

Staphylococcus saprophyticus is a type of Gram-positive bacterium that lacks the enzyme coagulase and does not induce the breakdown of red blood cells. It is commonly found in the form of a spherical shape and is frequently associated with simple urinary tract infections (UTIs), especially in sexually active young females. Infrequently, it is accountable for consequences such as acute pyelonephritis, urethritis, epididymitis, and prostatitis [5].

An acute uncomplicated urinary tract infection (UTI) is distinguished by the presence of dysuria and frequency in an immunocompetent, non-pregnant adult female. It is worth noting that this type of infection is the most prevalent bacterial infection among women. A complex infection often pertains to a patient who exhibits immunocompromised conditions, advanced age, male gender, pregnancy,

diabetes, and/or urologic abnormalities such as the presence of indwelling catheters or kidney disease [6].

The distinctive resistance of Staphylococcus saprophyticus to Novobiocin allows it to be differentiated from other coagulase-negative staphylococci. Like other urinary tract infections, S. saprophyticus utilizes the enzyme urease to produce ammonia. However, unlike many other species, it does not possess the capability to perform nitrate reduction [7].

Staphylococcus saprophyticus is a constituent of the indigenous microbial community found in various regions of the human body, including the perineum, rectum, urethra, cervix, and gastrointestinal system. Additionally, studies have indicated that S. saprophyticus is frequently present in the gut microbiota of pigs and cows. Consequently, consumption of pork and beef products may serve as a potential route for transmission of this bacterium to people [8].

Urinary pain is a frequently reported issue among persons seeking medical care in the United States. Urinary tract infections (UTIs) rank among the ten most frequently diagnosed conditions in emergency departments on an annual basis. Approximately 50% of females may encounter a urinary tract infection (UTI) at some point in their lives, and within the non-hospitalized patient population, the prevalence of UTIs caused by S. saprophyticus ranges from 5% to 20%. Despite the notable efficacy of treatment, it has been observed that a considerable proportion of patients, approximately 60%, are prone to experiencing a recurrent urinary tract infection (UTI) within a span of one year [9].

Methodology

The retrospective study, during January 10, 2023 and November 10, 2023, the total sample are 1000 urine sample. The samples were collected equally, as 500 urine samples were collected for males and 500 urine samples for females, and parameters of age, nutritional state, and use of antibiotics were taken without medical consultation. These samples were cultured on Blood agar and MacConkey agar, and some chemical tests were used for the purpose of diagnosing and isolating bacteria, and a drug sensitivity test was performed. using a variety of antibiotics in sterile conditions inside the Al-Habbobi Teaching Hospital laboratory.

Results

The Frequency and Percent of Proteus spp, Pseudomonas Spp and Staphylococcus spp.

The result show the Frequency and Percent of Pseudomonas Spp was Hight than Proteus spp and Staphylococcus spp (500.0 vs 250.0) (50.0% vs 25.0%) respectively. Overall, these results account for 100% of the total samples analyzed.

Table 1: The Frequency and Percent of Proteus spp, Pseudomonas Spp and Staphylococcus spp amount to the study group

Spp.	Frequency	Percent
Proteus Spp	250	25.0%
Pseudomonas Spp	500	50.0%

Staphylococcus spp	250	25.0%
Total	1000	100.0%

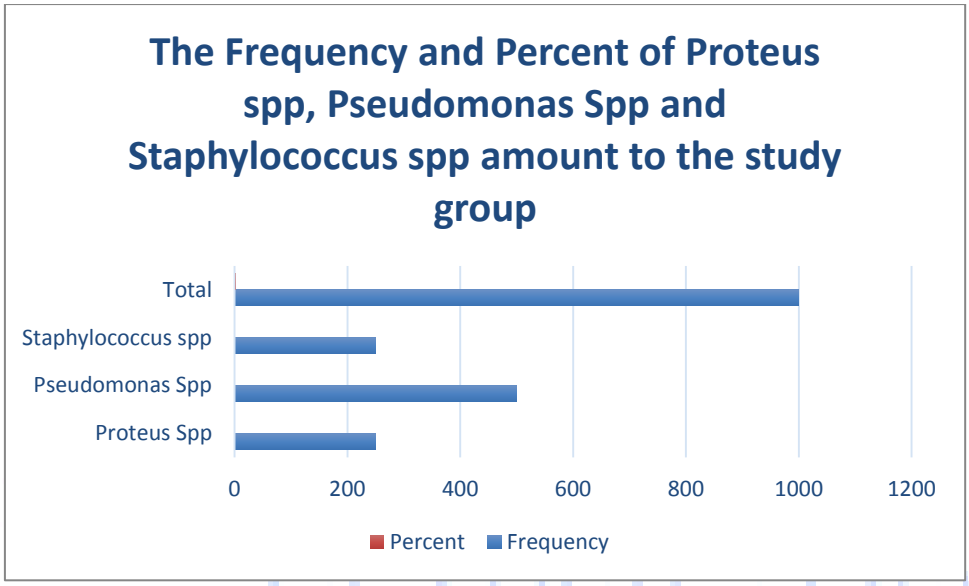

Fig 1: The Frequency and Percent of Proteus spp, Pseudomonas Spp and Staphylococcus spp.

The Frequency and Percent of Antibiotic amoung to the study group

In the study of antibiotic sensitivity profiles, the distribution of resistance frequencies among the sample population of 1000 urine culture. The frequency of AK was (173.0) in Percent (17.3 %) was the higher Frequency among others antibiotics, And The frequency of AMS was (46.0) in Percent (4.6%), So the frequency of ATM was (44.0) in Percent (4.4 %). And the result shows the frequency of AZM, CN, CRO, IMP, LEV and MEM was (41.0), CAZ, CTX, E, FBE (47.0), CIP, F (46.0), DO (62.0), FOX (87.0) and PRL (62.0).

Table 2: The Frequency and Percent of Antibiotic among to the study group

Antibiotic	Frequency	Percent
AK	173	17.3%
AMS	46	4.6%
ATM	44	4.4%
AZM	41	4.1%
CAZ	47	4.7%
CIP	46	4.6%
CN	41	4.1%

CRO	41	4.1%
CTX	47	4.7%
DO	62	6.2%
E	47	4.7%
F	46	4.6%
FEP	47	4.7%
FOX	87	8.7%
IMP	41	4.1%
LEV	41	4.1%
MEM	41	4.1%
PRL	62	6.2%
Total	1000	100.0%

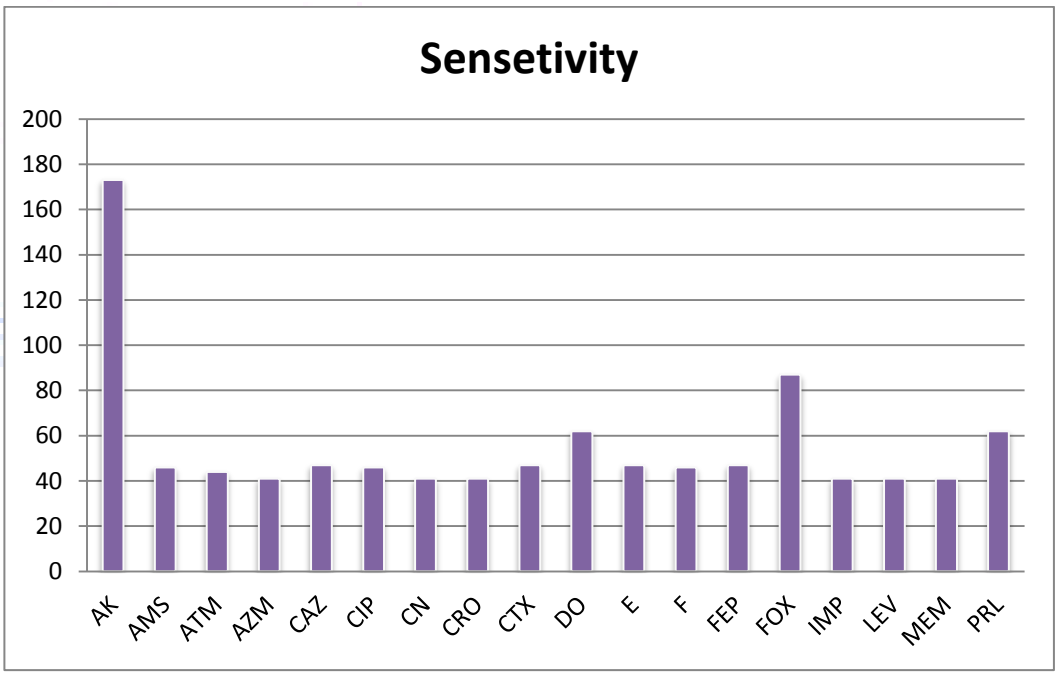

Fig 2: The Frequency and Percent of Sensitivity

The Frequency and Percent of the Proteus spp, Pseudomonas Spp and Staphylococcus spp according male and female of the study group.

The result show the frequency of Pseudomonas Spp was higher in female than male (300.0 vs 200.0) respectively. While the frequency of Proteus spp and Staphylococcus spp was higher in male than female (150.0 vs 100.0).

Table 3: The Frequency and Percent of the Proteus spp, Pseudomonas Spp and Staphylococcus spp according male and female of the study group.

Female			Male	
Spp.	**Frequency**	**Percent**	**Frequency**	**Percent**
Proteus spp	100	20.0%	150	30.0%
Pseudomonas Spp	300	60.0%	200	40.0%
Staphylococcus spp	100	20.0%	150	30.0%
Total	500	100.0%	500	100.0%

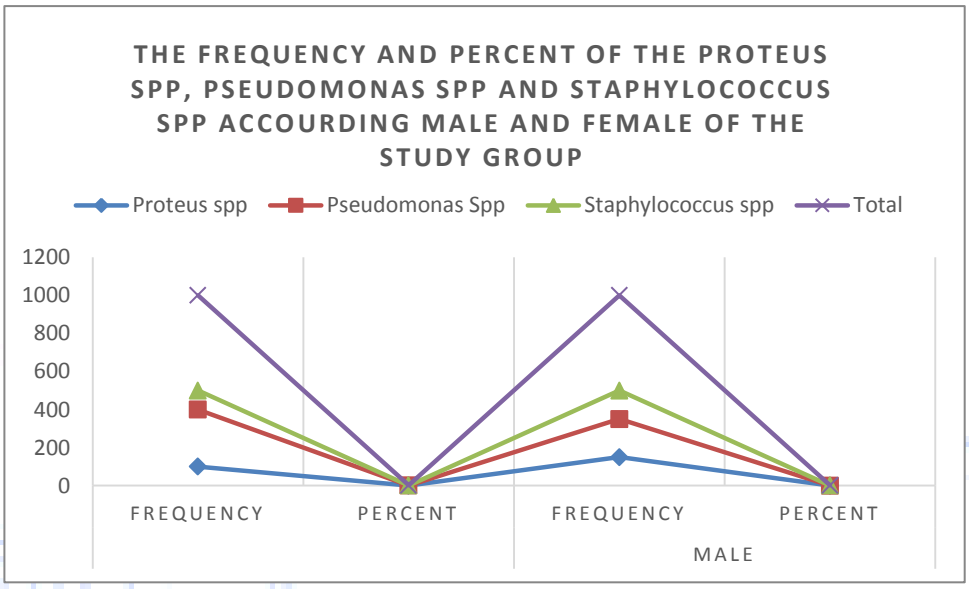

Fig 3: The Frequency and Percent of the Proteus spp, Pseudomonas Spp and Staphylococcus spp

The Frequency and Percent of the antibiotic sensitivity according male and female of the study group.

The results, according to the table below, according to compare the frequency of antibiotics between male and female, the frequency of AK was higher in male than female (89.0 vs 84.0). And the Frequency of AMS and F was 24.0 in female and 22.0 in male. And the frequency of ATM was equal in male and female (22.0). And the Frequency of AZM, CN, CRO, IMP, LEV and MEM was higher in male than female (21.0 vs 20.0). The result shows the frequency of CAZ, CTX, E and FEP was higher in female than male (24.0 vs 23.0), While CIP was similar in frequency in male and female (22.0). The frequency of DO and PRL was 32.0 in female and 30.0 in male. While the frequency of FOX was higher in male than female (44.0 vs 43.0).

Table 4: The Frequency and Percent of the antibiotic sensitivity according male and female of the study group.

	Female		Male	
Antibiotic	**Frequency**	**Percent**	**Frequency**	**Percent**
AK	**84**	**16.8%**	**89**	**17.8%**
AMS	**24**	**4.8%**	**22**	**4.4%**
ATM	**22**	**4.4%**	**22**	**4.4%**
AZM	**20**	**4.0%**	**21**	**4.2%**
CAZ	**24**	**4.8%**	**23**	**4.6%**
CIP	**23**	**4.6%**	**23**	**4.6%**
CN	**20**	**4.0%**	**21**	**4.2%**
CRO	**20**	**4.0%**	**21**	**4.2%**
CTX	**24**	**4.8%**	**23**	**4.6%**
DO	**32**	**6.4%**	**30**	**6.0%**
E	**24**	**4.8%**	**23**	**4.6%**
F	**24**	**4.8%**	**22**	**4.4%**
FEP	**24**	**4.8%**	**23**	**4.6%**
FOX	**43**	**8.6%**	**44**	**8.8%**
IMP	**20**	**4.0%**	**21**	**4.2%**
LEV	**20**	**4.0%**	**21**	**4.2%**
MEM	**20**	**4.0%**	**21**	**4.2%**
PRL	**32**	**6.4%**	**30**	**6.0%**
Total	**500**	**100.0%**	**500**	**100.0%**

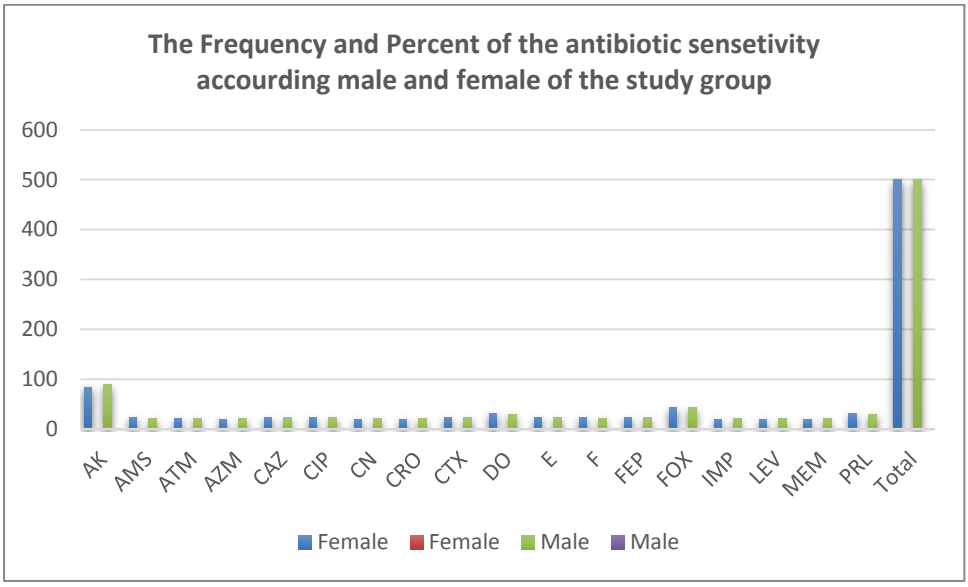

Fig 4: The Frequency and Percent of the antibiotic sensitivity according male and female of the study group.

Discussion:

The results of the study appeared an increase in the frequency and present of the pseudomonas spp in the study community, which includes 1000 urine culture samples, where the pseudomonas spp constituted 50 %, followed by Proteus spp and Staphylococcus spp in present 25%. This result is agree with [10].

Further research into the factors that contribute to the high frequency rate of Pseudomonas spp, such as environmental influences or patient demographics, may provide valuable insights into frequency rates. In addition, the balanced frequency of Proteus Spp and Staphylococcus Spp indicates the need for further research to understand the dynamics of these bacterial species in populations [11]. Exploring potential associations with patient characteristics, medical history, and geographic factors can enrich our understanding of these prevalence patterns. Overall, these findings will be used to track the spread of bacteria and guide strategies to mitigate related public health concerns, including antibiotic resistance and infection control [12].

When the frequency of bacterial species in urine samples according the sex, some interesting patterns emerge. Among females, Pseudomonas Spp is the most frequent at 60.0%, followed by Proteus Spp and Staphylococcus Spp, each at 20.0%. In contrast, Pseudomonas Spp bacteria remain the most frequent among males, but at a slightly lower rate of 40.0%, while the frequency of Proteus Spp and Staphylococcus Spp is 30.0%. This occurs due to weak immune responses in women and due to the bacteria's resistance to different types of antibiotics. Women always suffer from problems with urinary tract infections for several reasons, including the use of contraceptives, poor nutritional quality, or the use of some treatments that affect the immune system in women. This result is agree with [13].

The differences in the spread of bacteria between males and females have many factors that lead to the emergence of the difference between the sexes, for example, hormonal factors, changes, immune reactions, and chronic diseases that can negatively affect a person's health [14].

Understanding the factors that contribute to observed prevalence patterns by sex may also influence infection prevention and control measures. For example, if certain bacterial species indicate a higher frequency in women, this information could be used to reduce the risk of urinary tract infections in this demographic group [15].

The male and female groups used antibiotics in various ways. According to the findings, both men and women used AK more frequently than other antibiotics. This is because AK is more effective than other antibiotics at killing bacteria and restoring health after an infection because it attaches to the 30S ribosome, inhibiting messenger RNA and preventing protein formation within the bacterial cell. This outcome is consistent with [16].

This distribution of antibiotic use by male and female may give researchers and doctors with important new insights. Understanding how men and women utilize antibiotics differently can help create more personalized and successful treatment regimens. It can also lead to further investigation into the underlying causes of these differences, such as differences in sensitivity to certain antibiotics based on biological or lifestyle factors [17].

There may be many reasons behind this diversity in antibiotics between the male and female. For example, there are many people who use antibiotics without Consult a doctor, which leads to their ineffectiveness in treating bacterial diseases due to genetic mutations that have an effective role in resisting this type of infection. Antibiotics, in addition to some treatments, are given in the form of tabs and the patient can obtain them easily from pharmacies or clinics. This is also the reason behind a very small percentage of frequency of ciprofloxacin, while amikacin is available for intramuscular injection, and this has led to the fact that the patient cannot take it without Consult a doctor, and from here. We conclude that antibiotics must be taken with the advice of a specialist doctor after conducting the necessary examinations and tests for the purpose of eliminating antibiotic resistance in the future [18].

Conclusion:

The study's findings provide important insights into the prevalence of bacterial species and antibiotic resistance profiles in the studied population. Pseudomonas spp emerged as the most prevalent bacterial species, with notable resistance observed against antibiotics AK, FOX, DO, and PRL. Gender-related differences in bacterial prevalence and antibiotic usage were also highlighted, emphasizing the need to understand such variations within the studied population. These findings offer valuable contributions to epidemiology and public health, laying the groundwork for further research and potential implications for clinical practice and public health interventions. Subsequent analyses can expand on these findings to enhance our understanding and management of bacterial prevalence and antibiotic resistance across diverse populations.

Ethical approval:

All patients involved in this work were informed and the agreement was obtained verbally from each one before the process of sample collection. This study was approved by the Committee on Publication Ethics at the Thi-Qar Health Directorate, Al Habbobi Teaching Hospital

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