World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-5, December 2021
ISSN: 2749-3644

BACTERIAL STUDY OF BACTERIA SPECIES CAUSING URINARY TRACT INFECTION IN KIRKUK CITY.

Marwa Jassim Mohammed
E-mail: Marwa.jassim1987@gmail.com
Religious Education and Islamic Studies Directory, Kirkuk, Iraq

Article history:

Received: September 30th 2021
Accepted: November 1st 2021
Published: December 7th 2021

Abstract:

When speaking of the human urinary tract, we are referring to an integrated system of collection and emptying, which consists of Kidneys, ureters, bladder and urethra , Urinary tract infection affects both genders and it is an infection affecting infants and children. The current study aimed to investigate the bacterial species that cause urinary tract infection, where 65 urine samples were collected from patients of different ages and both gender. The results showed that E.coli, a Gram-negative bacteria, was the main cause of UTI with a percentage of 30%, followed by Gram-positive bacteria, Staphylococcus aureus, with a percentage of 24%.The lowest rate of infection was by Proteus mirabilis bacterium at 4%.

Keywords: UTI, E. coli, Staphylococcus aureus, Drug sensitivity.

INTRODUCTION:

The urinary system consists of the kidneys, ureters, and urethra, and it is one of the important organs in the human body in terms of the nature of its work, as it purifies the blood fluid from excess and harmful substances by getting rid of it in the form of urine. The nature of urine and its components and specifications reflect the physiological state, whether it is normal or unnatural (pathological), as well as other kidney functions as it works to maintain the natural balance of body fluids [1].

UTI occurs by microbial invasion of any tissue in the urinary tract, as it extends from the urethra to the kidney, where bacteria colonize and multiply within this tract [2]. The mechanism of action of the kidney in addition to filtering the blood is to reduce the risk of infection by preventing the return and flow of urine again to the kidney after leaving it, and thus the bladder without the kidney is affected by urinary tract infection [3].

Most urinary tract infections are uncomplicated, but there are other categories, including complex, acute and recurrent, as well as simple ones without symptoms. These categories are classified on the basis of signs, symptoms and results obtained by examining and diagnosing laboratory results and the type of microbiological invasion [4]. In health cases, the urine is free from any bacterial, viral or fungal contamination, as infection occurs spontaneously through the arrival of intestinal bacteria located in the anus and close to the urinary opening [5]. Among other causative organisms, bacteria are the main cause of many cases of UTI, the most important of which is E.coli, a gram-negative intestinal bacteria that is isolated from the urine of infected persons [6].

The widespread and ill-advised use of antibiotics led to problems represented by urinary tract infection [1]. If the infection is not left or not diagnosed immediately or may be misdiagnosed, the infection may lead to serious health effects on humans such as kidney damage. However, proper knowledge of UTIs and associated risk factors must be taken into account to allow timely intervention to control the disease quickly [7].

METHODOLOGY :-

1-Collect samples

This study was conducted in the city of Kirkuk / Iraq, where 65 samples of both sexes and of different ages were collected for people suffering from symptoms of urinary tract infection (such as bladder and flank pain, frequent urination, dysuria, fever, and despite emptying the bladder, the patient feels the need to urinate) And they did not take antibiotics for at least a week before taking the sample.

2- Urine Sample Analysis

65participants' urine samples were subjected to microscopic observation to test different pathological parameters. Microscopy was performed as well as dipstick analysis using urine strip chemical reagent consisting of 10 variables [8,9]. Briefly, 10 ml of the urine sample was centrifuged at 2000–3000 revolutions per minute (rpm) for 5 min. The supernatant was poured after centrifugation and a drop of sediment was placed on a glass microscope slide, covered with a slide cover and examined with a compound microscope under a 10× lens. This was followed by a scan under 40× objective. The aim was

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-5, December 2021
ISSN: 2749-3644

to determine the presence of white blood cells, red blood cells and pus cells, bacteria or yeast, molds, and crystals, in urine [9].

3- Bacterial Isolates Identification

Urine samples were cultured on blood agar medium for the growth of most bacterial species, as well as on MacConkey agar medium for growth of Gram-negative bacterial species and differentiated from gram-positive species, and also on Mannitol salt agar medium for differentiation. Among the types of Staphylococcus bacteria, the cotton swab was rotated in a small area of the dish, and then the sample was spread by a sterile loop bacterial vector in the planning method, and the dishes were incubated at a temperature of (37°C) for 24 hours[10].

4- Drug sensitivity test

The Diffusion method (Kirby-Bauer method) was used. Bacteria were inoculated with Nutrient broth test tubes and incubated for 2-5 hours until turbidity appeared. The suspension was diluted with physiological saline solution and compared with the turbidity of MacFarland tube No. 0.5 (containing approximately 1.5 x 108 cells/ml) (11). The bacteria were inoculated on Muler-Hinton Agar medium (the bacteria prepared in the first step) by swab, and then left to dry for 2-5 minutes to imprint the bacteria on the culture medium. The antibiotic tablets were placed on the surface of the culture medium using sterile forceps, then the culture medium was incubated in the incubator for less than 24 hours at a temperature of 37 °C [11]. The presence of growth-free areas around the discs called the inhibitory zone was observed using a ruler to measure the diameter of the inhibition [12], and it was compared with the standard tables installed [13].

Results and Discussion:-

Out of 65 samples, 50 were diagnosed with UTI, while the other 15 samples showed negative results, and an average of 15 male samples and 35 female samples.

The ages ranged between 10-40 years, and the most affected individuals were children between 10-15 years, with an average of 13 female samples and 6 male samples, while the least infected individuals were between 16-20 years old, with an average of 2 females only, according to Table 1.

Table -1
A table showing the distribution of ages and genders.

ages	female	male	Total
10 – 15	13	6	**19**
16 – 20	2	0	**2**
21 – 25	5	1	**6**
26 – 30	9	4	**13**
31 – 35	3	1	**4**
36 – 40	3	3	**6**
Total	**35**	**15**	**50**

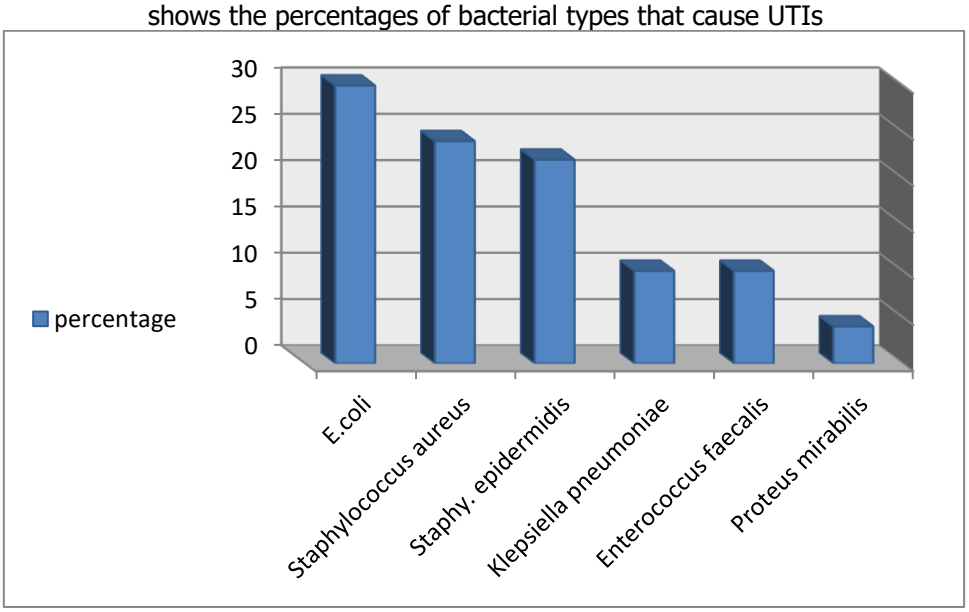
One of the most common diseases is urinary tract infections, which affect children and the elderly in medical practice today[14]. Females have a higher incidence of UTI compared to males, which may be due to either anatomical predisposition, adhesion of the uroepithelial mucosa to the mucopolysaccharide lining, or other host factors" [15]. Previous studies indicate that about 35% of healthy women at some point in their lives experience symptoms of a UTI. About 5% of women every year suffer from the problem of painful urination (dysuria) and its return frequently[16]. Many microorganisms cause UTIs. Approximately 95% of UTIs are caused by bacteria, which usually multiply at the opening of the urethra and travel to the bladder [17].

Gram-positive and Gram-negative bacteria are the main cause of urinary tract infection Which is one of the most common diseases It is so common that it is ranked second after urinary tract infections respiratory [18].

The results of the current study showed the isolation of species of UTI-causing bacteria, including Gram-positive bacteria and Gram-negative bacteria. The results showed that E.coli, a Gram-negative bacteria, was the main cause of UTI with a percentage of 30%, followed by Gram-positive bacteria, Staphylococcus aureus, with a percentage of 24%.The lowest rate of infection was by Proteus mirabilis bacterium at 4%, and the rest of the species were graded by infection rate according to Table No. 2

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-5, December 2021
ISSN: 2749-3644

Figure-1
shows the percentages of bacterial types that cause UTIs



E. coli bacteria were isolated from urinary tract infection [19,20], where this bacteria is considered one of the most important causes of UTI, where the prevalence rate of the disease due to this bacteria is about 30-70% [21].

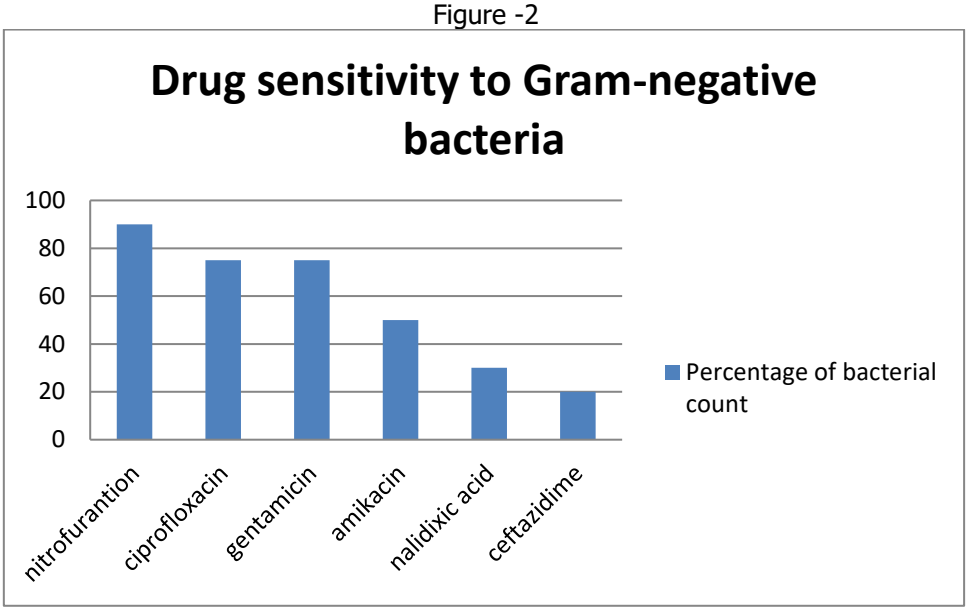
The K.pneumoniae and Staphylococcus aureus were isolated by researchers Ahmed et al[7] from UTI Both are considered bacteria Producers of broad-spectrum beta-lactamase enzymes Germs that cause a worsening problem and a challenge to a clinic In general, high rates of mortality and morbidity occur, This is due to the possession of many virulence factors and toxins, such as Heamolysin type 1, 3 capsular polysaccharide polysaccharides It includes the presence of various types of stickers, such as fimbriae Capsular as well as its production) Extended spectrum ß-lactemases (Which enhances their resistance to antibiotics [22,23].

Proteus mirabilis was also isolated by researchers [24], where they showed that Proteus bacterium is responsible for urinary tract infection in both humans and sheep, as they showed that flank pain, fever and bloody urination are common symptoms in cases of infections.Urinary tract. Previous studies confirmed the isolation of Enterococcus faicalis bacteria from UTI, as it was one of the pathogens [25].

A sensitivity test was conducted for bacterial isolates isolated from patients with urinary tract infection towards some antibiotics, where the results of Gram-negative bacteria showed a high sensitivity to the antibiotic Nitrofurantion by 90%, and the lowest sensitivity was to the antibiotic Ceftazidime by 20%, and the rest of the proportions of antibiotics ranged between these two the two ratios. As shown in Figure (2) . The results of the study were close to the results of (Ahlam), which indicated a high sensitivity to the anti-Nitrofurantion by 88% and the least sensitivity to the anti-Ceftazidime by 20%.

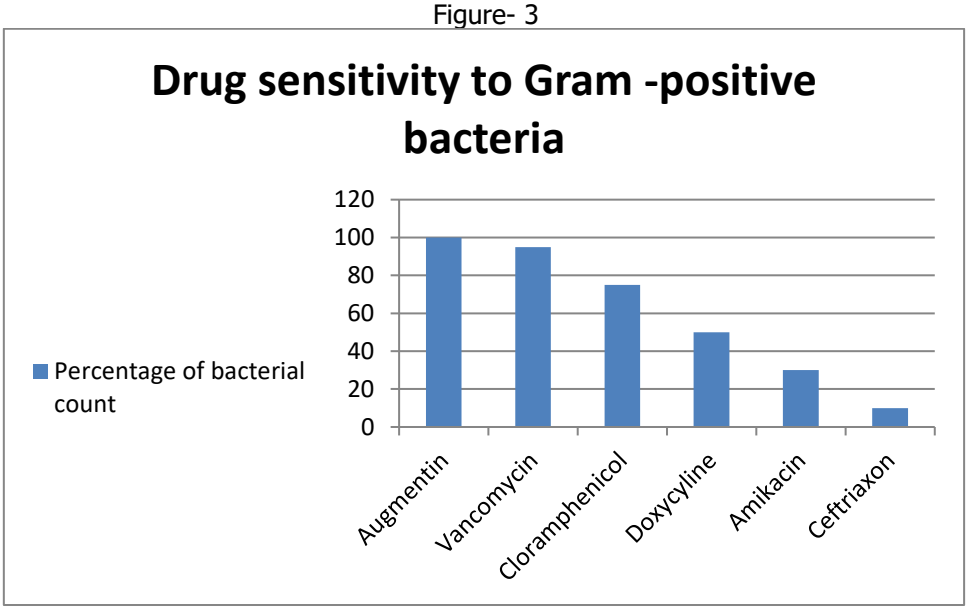
World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-5, December 2021
ISSN: 2749-3644

Figure -2



The results of the current study also showed drug sensitivity of Gram-positive bacteria with complete sensitivity to the antibacterial Augmentin, as well as a sensitivity of 95% to the antibiotic Vancomycin, while it showed a sensitivity of 10% to the antibiotic Ceftriaxone according to Figure 3.

Figure- 3



We note through the results of this study that the nature of antibiotic resistance is on the increase, according to the results reached by previous studies conducted in this field [26]. This may be due to the wrong and indiscriminate use of antibiotics by patients, where the widespread and multiple use of antibiotics and in a large way led to the development of bacteria resistance over time to one or more of the antibiotics [27].

As well as the ability of bacteria to develop means to defend themselves in several ways, and the possibility of transferring these means from one sex to another, as there are enzymes that inhibit the antibiotic, such as beta-lactamase enzymes, which work to break the amide bond in the beta-lactam ring, which converts penicillins into penicilloic acid As for cephalosporins to cephalosporonic acid, therefore, the antibiotics lose their ability to bind with the binding proteins with penicillin and become ineffective [28]. Also, resistance increases due to changing the target site, which loses the affinity of the target to the antigen, or resistance may result through changing metabolic pathways [29].

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-5, December 2021
ISSN: 2749-3644

REFERENCES:

1- Brooks, G., Carroll, K. C., Butel, J., and Morse, S. (2013). Jawetz Melnick and Adelbergs Medical Microbiology 26th.ed. McGraw Hill Professional.
2- Wagenlehner, F. M. E., Niemetz, A. H., Weidner, W., & Naber, K. G. (2008). Spectrum and antibiotic
3- resistance of uropathogens from hospitalised patients with urinary tract infections: 1994–2005. *International journal of antimicrobial agents*, *31*, 25-34.
4- Hsieh, M. H., Wood, H. M., Dicianno, B. E., Dosa, N. P., Gomez-Lobo, V., Mattoo, T. K., ... & Bavendam, T. (2017). Research needs for effective transition in lifelong care of congenital genitourinary conditions: a workshop sponsored by the National Institute of Diabetes and Digestive and Kidney Diseases. *Urology*, *103*, 261-271..
5- Johansen, T. B., Bonkat, G., Cai, T., Tandogdu, Z., Wagenlehner, F., & Grabe, M. (2016). Grey zones in the field of urinary tract infections. *European urology focus*, *2*(4), 460-462.
6- Vernon, S., Foo, C. K., & Coulthard, M. G. (1997). How general practitioners manage children with urinary tract infection: an audit in the former Northern Region. *British Journal of General Practice*, *47*(418), 297-300.
7- Obi, C. L., Tarupiwa, A., & Simango, C. (1996). Scope of urinary pathogens isolated in the Public Health Bacteriology Laboratory, Harare: antibiotic susceptibility patterns of isolates and incidence of haemolytic bacteria. *The Central African journal of medicine*, *42*(8), 244-249.
8- Odoki, M., Almustapha Aliero, A., Tibyangye, J., Nyabayo Maniga, J., Wampande, E., Drago Kato, C., ... & Bazira, J. (2019). Prevalence of bacterial urinary tract infections and associated factors among patients attending hospitals in Bushenyi district, Uganda. *International journal of microbiology*, *2019*..
9- Oladeinde, B., Omoregie, R., Mitsan, O. and Anunibe, J. (2011) Urinary Tract Infection in a Rural Community of Nigeria North. *North American Journal of Medical Sciences*, 3, 75-77.
10- Kabugo, D., Kizito, S., Ashok, D.D., Kiwanuka, A.G., Nabimba, R., Namunana, S., et al. (2016) Factors Associated with Community-Acquired Urinary Tract Infections among Adults Attending Assessment Centre, Mulago Hospital Uganda. African Health Sciences, 16, 1131-1142.
11- Kelly, C. M., Heidir, S., Cowan, M .K., and Smith, H. (2017).Microbiology, 5th ed. Aystems Approach, Mc Graw-Hill. USA. 53.
12- Mahon, C. R., Lehman, D. C.and Manuselis, G. (2014).Textbook of Diagnostic Microbiology.5th ed. Saunders Elsevier.Inc. China
13- Tille, P. (2015). Bailey and Scott's Diagnostic Microbiology,14th.ed. Elsevier Health Sciences. USA.
14- CLSI, (Clinical and laboratory Standard Institute). (2018). Performance standard for antimicrobial susceptibility testing; Twenty-Six informational Zsupplement.
15- Raju, C. B., & Tiwari, S. C. (2004). Urinary tract infection–A suitable approach. Lecture notes. *J. Ind. Academy of clinical Med*, *2*(4), 331-334.
16- Schaeffer, A. J., Rajan, N., Cao, Q., Anderson, B. E., Pruden, D. L., Sensibar, J., & Duncan, J. L. (2001). Host pathogenesis in urinary tract infections. *International journal of antimicrobial agents*, *17*(4), 245-251.
17- Hootan, T.M., 2003. Urinary tract infection in adults, In: Johnson R.J., Feehally J., (Eds). Comprehensive clinical nephrology, 2 ed, London: Mosby, pp: 731-744.
18- Emiru, T., Beyene, G., Tsegaye, W., & Melaku, S. (2013). Associated risk factors of urinary tract infection among pregnant women at Felege Hiwot Referral Hospital, Bahir Dar, North West Ethiopia. *BMC research notes*, *6*(1), 1-6.
19- Srivastava, R. N., & Vasudev, A. S. (2011). Urinary tract infections—current management. *Apollo Medicine*, *8*(4), 270-275.
20- Al-Hasnawy, H. H., Judi, M. R., & Hamza, H. J. (2019). The dissemination of multidrug resistance (MDR) and extensively drug resistant (XDR) among uropathogenic E. coli (UPEC) isolates from urinary tract infection patients in babylon province, Iraq. *Baghdad Science Journal*, *16*(4 Suppl.), 986-992.
21- Ahmed, N. A., Mahmood, S. S., & Abbas, A. H. (2019). A COMPARATIVE STUDY OF SOME VIRULENCE FACTORS AND PHYLOGENETIC CHARACTRIZATION OF Escherichia. coli ISOLATES CAUSING URINARY TRACT

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-5, December 2021
ISSN: 2749-3644

INFECTION AND THE COMMENSAL GUT. *The Iraqi Journal of Agricultural Science*, *50*(3), 1193-1198.

22- Flores-Mireles, A. L., Walker, J. N., Caparon, M., & Hultgren, S. J. (2015). Urinary tract infections: epidemiology, mechanisms of infection and treatment options. *Nature reviews microbiology*, *13*(5), 269-284.

23- Lin, H. A., Huang, Y. L., Yeh, K. M., Siu, L. K., Lin, J. C., & Chang, F. Y. (2016). Regulator of the mucoid phenotype A gene increases the virulent ability of extended-spectrum beta-lactamase-producing serotype non-K1/K2 Klebsiella pneumonia. *Journal of Microbiology, Immunology and Infection*, *49*(4), 494-501.

24- Blomqvist, S., Leonhardt, Å., Arirachakaran, P., Carlen, A., & Dahlén, G. (2015). Phenotype, genotype, and antibiotic susceptibility of Swedish and Thai oral isolates of Staphylococcus aureus. *Journal of oral microbiology*, *7*(1), 26250.

25- Al-Ezzy, A. I. A., Khazzal, S. A., & Qasim, A. R. (2018). ISOLATION OF Proteus mirabilis FROM URINARY TRACT INFECTIONS OF HUMAN AND OVINE IN BAQUBAH-DIYALA PROVINCE. *Diyala Journal of Agricultural Sciences*, *10*(Special Issue).

26- Bohan, A. J. (2018). Antibacterial Activity of Zinc Oxide Nano Particles against Bacteria Isolated from Infants with Urinary Tract Infection. *Al-Mustansiriyah Journal of Science*, *29*(2), 34-42.

27- Hassan, A. A., Mahdi, N. B., & Abbas, S. K. SIGNIFICANT CORRELATION BETWEEN IL-18 AND COMPLEMENT COMPONENT C3 IN CHRONIC RENAL FAILURE PATIENTS INFECTED WITH ESCHERICHIA COLI.

28- Chowdhury, S. and Parial, R. (2015). Antibiotic susceptibility patterns of among urinary tract infection patients in Chittagong, Bangladesh. SMU Medical Journal, 2(1): 114-127 .

29- Forbes, B. A., Sahm, D. F., and Weissfeld, A. S. (2007). Bailey and Scott's diagnostic microbiology.12th.ed Mosby Elsevier.

30- Tortora, G. J., Funke, B.R., and Case, C.L.(2010) . Microbiology An introduction.10th. ed. Pearson Benjamin Cummings U.S.A .