

# The Role of Bacteria in Urinary Tract Infection Incidence in Students University

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## ABSTRACT

This study was carried out from November 2016 to March 2017. One hundred sixty study samples were collected from the students of the university weekly, which were studied by conducting bacteriological tests on them within 24 hours from the date of collecting the sample, the results of the study showed the isolation and diagnosis of different bacterial species with varying prevalence rates. The *Escherichia coli* showed the highest incidence of 50% followed by *Enterococcus fecalis* 36.2%, *Pseudomonas aeruginosa* 34.8%, *Enterobacter cloacae* 26.8%, *Staphylococcus aureus* had a prevalence rate of 22.5%. *Salmonella typhi* had a prevalence rate of 16.6%. *Proteus mirabilis* showed an average prevalence of 12%. *Klebsiella pneumonia* was 9.4%, while *Vibrio parahaemolyticus* and showed the lowest incidence of 0.7%. The results of the study showed that the total number of infected cases was 138 of the studied samples, 86.2%, distributed among 80(50%) in female infection cases, and In males 58 infection cases, a rate of 36.2%.

**Keywords:** Bacteria, Bacterial isolation, Microorganisms, Urinary Tract Infection.

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## INTRODUCTION

Urinary tract infection (UTI) is one of the most serious and dangerous diseases that threaten the general health of the human being, causing great damage to the urinary system, especially when the development of the disease and progress of the disease resulting in the subsequent kidney deficiency and the associated effects on the rest of the body's various organs. The urinary tract infection to the presence of microorganisms in the urinary tract, although it may be difficult to distinguish between pollution, colonization, or infection (Verrier, J. K, 2000).<sup>1</sup>

UTIs are common among all individuals and ages and are one of the most serious diseases a person can face Especially women, while urinary tract infection among men is not a common disease, but at the same time, it is very dangerous if a man is infected with inflammatory problems in his urinary system (Patterson & Andriole, 1997).<sup>2</sup>

The incidence of U.T.I varies according to age and sex and is more frequent in females than in males of all ages, except in early childhood (less than three months) Where they are more likely to occur in males than in females (England *et al.*, 2002).<sup>3</sup>

UTI is a health problem affecting millions of people, both male and female And the incidence of women more than men and the reason is due to the shortness of women's urethra and its proximity to the anus Which increases the process of contamination of urinary tract bacteria, As well as that pregnancy and childbirth cause changes in physiology and

changes in the mucous tissue lining the urinary tract and genital As well as the occurrence of menstruation in women (Azubikes *et al.*, 1994).<sup>4</sup>

Most urinary tract infections are caused by Gram-negative bacteria such as *E. coli*, *Proteus mirabilis*, and *Klebsiella spp.*, *Pseudomonas aeruginosa*, Urinary Tract Infections are also caused by the Gram-positive bacteria and these Enterococcus Staphylococcus, because most of them have virulence factors that prevent them from invading the Urinary Tract System (Tangho & Mcaninch, 2004; Al- Shebani & Al- Jeboury, 2008).<sup>5,6</sup>

The severity of urinary tract infections ranges from non-accidental bacterial infections to fatal infections, where U.T.I is an important cause of septicemia. And a high rate of mortality, especially among the elderly, is one of the main causes of Bacteremia in Gram-negative bacteria (Mathai *et al.*, 2001).

95% of urinary tract infections are diagnosed in patients with the urethra, urinary bladder, ureter, and kidney kidneys (Meyrier, 2000).<sup>8</sup>

The UTI may be the only disease people experience. The secondary disease may be the presence of other diseases. Where the infection may be isolated and may be associated with other conditions such as gastritis, gastroenteritis, malnutrition, and acute respiratory infection. The incidence of urinary tract infections may be related to patients' conditions, races, and ages more than to the symptoms of various urinary tract infections (Vernon & Coulthard, 1997).<sup>9</sup>

## MATERIALS AND METHODS

### Materials

All these media were used MacConky agar medium, blood agar base medium, peptone water medium, Simmon citrate agar, triple-sugar iron agar, urea base agar medium, gelatin liquefaction medium, motility semisolid medium, Methyl-Red Voges Proskauer (MR-VP), tryptone Soya agar, mannitol salt agar, nutrient agar, nutrient broth, salmonella-shigella agar, brain heart infusion agar, CHROM agar vibrio medium, CHROM agar pseudomonas, CHROM agar orientation, CHROM agar salmonella, CHROM agar staphylococcus aureus, Muller Hinton agar, eosin methylene blue agar, thiosulphate citrate bile sucrose agar and brain heart infusion broth. Media were attended according to the company instructions for each one.

### Methods

#### Sample collection

The study carried out from November 2016 until March 2017, Where samples were collected weekly from the students of Al-Muthanna University. The midstream urine was taken from sterile bottles, it has been clarified sampling method for all students after wash the area with soap and water and without the use of antiseptics, with an emphasis the bottles to not touch of any part of the body parts to prevent contamination of natural flora. 5 mL of urine were taken and concentrate by centrifuge (300 r/min) for 5 minutes, then the upper liquid was disposed, and a drop of precipitate was taken and examined under the microscope to investigate about: pus cells, bacterial cells, epithelial cells, red blood cells, and crystal and casts.

#### Bacterial analysis

- Bacterial isolation:

To identify the types of bacteria possible presence in the samples of urine, the taken samples were culture on Brain heart infusion broth for activate the bacteria and isolate the higher number of types that that could potentially presence in samples of urine because this media is Enriched and incubated for 24 hours and the temperature of 37 C°.

Then activated bacteria were cultured by streaking on Nutrient agar, Blood base agar, and MacConkey agar, after incubated for 24 hours at 37 C° secondary culture was done for the growing colonies on Selective media. As each group of bacteria has special selective media for its growth so that it shows morphological characteristics that distinguish them from others and sometimes inhibit the growth of other groups of bacteria.

- Bacterial samples, identification:

Isolates diagnosed depending on Bergey's manual (Holt et al., 1994).<sup>10</sup> and according to the methods used by (Macfaddin, 2000).<sup>11</sup>

## RESULTS AND DISCUSSION

The inability to make progress in the control of urinary tract infection is characterized by permanence and continuity And steadily throughout the past and current decades And has become in the ranks of the most frequent injuries resulting in health problems of great importance to the disease. This study reflected a clear picture of the bacteria that cause the infection of urinary tracts in the mirror of the micro-society, namely university students; Table 1 shows the relationship between the percentage of infection and sex, Where the percentage of female infection was 50% while males accounted for 36.2% of the total number of samples 160. This is due to several factors, including that women are exposed to the activities of the menstrual cycle and the subsequent change of normal flora. As the presence of normal flora in the exit, which may colonize the opening of the vagina and urethra and then hit the bladder. Also, contributing to the migration of nurses from the urethra to the bladder and to the kidney, which helps her in the palace of the urethral and near the opening of the exit of the hernia (Sheffield and Gunningham, 2005).<sup>12</sup>

While the anatomy of the urinary system in males and in which the urethra is away from fecal contaminants As well as prostate secretions with antibacterial properties that establish good protection against bacterial invasion of the urinary system (Larabi *et al.*, 2003).<sup>13</sup>

However, many studies suggest that males are considered to be a major cause of recurrent urinary tract infections in females by carrying out pathogens without symptoms, which results in repeated recurrence after sexual intercourse in women (Crook, 1995).<sup>14</sup>

The anatomical location of the female urethra is higher than the vaginal cavity, which is characterized by the occurrence of congenital urinary malformations in which the female is present, as is the case in the distal urethral root deformity, as well as lack of movement, physical effort, obesity and lack of drinking fluids, are additional factors for urinary tract infections. There are hormonal reasons, especially for pregnant women and the absence of prostate in females (Fihn, 2003).<sup>15</sup> This is consistent with many studies conducted in many places in the world, including Britain (Nicolle *et al.*, 1993),<sup>16</sup> America (Beuben *et al.*, 2000; Ozgur *et al.*, 2000),<sup>17,18</sup> Australia (Fung & Berman, 1982),<sup>19</sup> And Iraq (Ahmed, 1997).<sup>20</sup>

Other factors that make females more susceptible to UTI than males are the pH change of the vagina, which leads to the colonization of bacteria in epithelial cells, The colonization of bacterial cells in the tissue surrounding the urinary cavity and the vaginal entrance is a beginning resulting in exposure (Stamy and Sexton, 1975).<sup>21</sup>

The results are as shown in Figure 1 and Table 2 to the presence of different types of bacterial species that cause the

**Table 1:** Shows the prevalence of gravel for both sexes.

Sex	No. of cases	Positive cases	Percentage %	Negative cases	%
Female	85	80	50	5	3.1
Male	75	58	36.3	17	10.6
Total	160	138	86.3	22	13.7

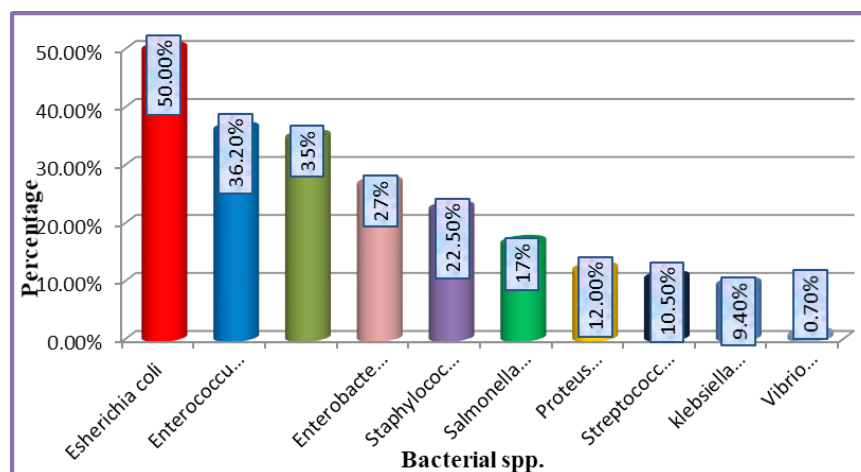


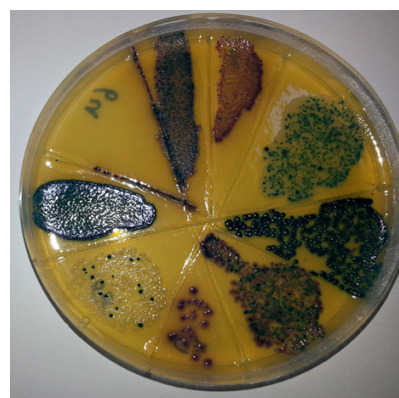
Figure 1: Shows the percentage of bacterial species that isolated from the study.

Table 2: Shows the number of isolated bacterial species in both sexes (males and females).

M.O	Female	Male	Total	Percentage %
E.Coli	39	30	69	50
Enterococcus faecalis	44	6	50	36.2
Pseudomonas aeruginosa	32	16	48	34.8
Enterobacter cloacae	25	12	37	26.8
Staphylococcus aureus	21	10	31	22.5
Salmonella typhi	12	11	23	16.6
Proteus mirabilis	10	7	17	12
Klebsiella pneumonia	8	5	13	9.4
Vibrio parahaemolyticus	1	0	1	0.7

UTI *E.Coli*, *Enterococcus faecalis*, *Pseudomonas aeruginosa*, *Enterobacter cloacae*, *Staphylococcus aureus*, *Salmonella typhi*, *Proteus mirabilis*, *Klebsiella pneumonia*, *Vibrio parahaemolyticus*. Which is the proportion of their presence, respectively 69 (50%), 50 (36.2%), 48 (34.8%), 37 (26.8%), 31 (22.5%), 23 (16.6%), 17 (12%), 13 (9.4%), 1 (0.7%), *E. coli* is the most common cause of urinary tract infection. This may be due to its adaptation to living in the human urinary tract due to environmental conditions in these places. As well as possessing many of the factors of ferocity, the most important factors are adhesion, It also has the ability to produce the enzyme hemolysin, and antigen O and K were the main cause of UTI by 90% in females of puberty. These results were consistent with many studies (Naylor, 1998);<sup>22</sup> (Brooks *et al.*, 2007).<sup>23</sup>

The main source of UTI is the gastrointestinal tract of the rectum, where bacteria are found in the feces. They are natural calflia and are similar to *E. coli* This is in addition to the presence of *Staphylococcus aureus*, which is endemic to the rectum. But, when it moves from its original place to another place becomes satisfactory and being in the vagina leads to the killing of natural flora, which is characterized by lactobacillus, which works to produce hydrogen peroxide, leading to the rapid colonization of the area by *E. coli* bacteria. In addition to the palace of the urethra and its proximity to the opening of the urethra, a small number of colonized bacteria of the urethral region or under the urethra enter the bladder and thus colonize the area with *E. coli* repeatedly (Braunwald *et al.*, 2001).<sup>24</sup>



**CHROMagar Orientation:** *Enterococcus feacalis*. (blue-green), *Enterobacter cloacae* (dark blue). *Klebsiella pneumonia*. (dark blue mucoid), *Staphylococcus aureus* (white to cream, small colonies) *Proteus mirabilis*. (brown with halo), *Escherichia coli* (dark rose to pink)

The presence of some bacterial species leads to the emergence of a common infection in the urinary tract and this is what was observed in our study Where the presence of *Klebsiella pneumonia* bacteria led to the emergence of a common infection with bacteria *E. coli* and thus increase the incidence of colorectal infection, and these results were consistent with (Brooks *et al.*, 2007).<sup>23</sup>

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