

# Distribution of Pathogenic Bacterial Causing Urinary Tract Infection and their Sensitivity and Resistant to Antibiotics

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## Abstract

**Background,** Urinary tract infection is one of the common infections in the Libya community. Distribution and susceptibility of causing pathogens change rendering to period and place. UTI are difficult infections, because UTI sick of children, men and pregnant women.

The aims of this study are determine the relationship between UTI and gender and age by determine the prevalence of UTI in children, men and women, and observe the more common pathogenic bacteria in UTI. Also, to determine the antimicrobial susceptibility of pathogenic bacteria.

Study area, The data of the present article had taken from the recorders of medical laboratory of urine cultures and sensitivity of Zawia's hospital, Zawia city in Libya. Study target, UTI patient's children, women and men.

This study detected that bacteria were sensitive to some antibiotics and resist to the others; all types of important pathogenic bacteria were sensitive to both antibiotics Cip and AR. In addition to last antibiotics E. coli, K. pneumonia, P. aeruginosa and S. marcescens were also sensitive to CTX, Amc, SXT, Ipm, and Gm. In opposite to theses pathogenic bacteria, some pathogenic bacteria appearance resistant to some antibiotics as fallow; K. pneumonia, K. oxytoca, E. cloacae, S. marcescens and C. koseri appearance resistant to Amp.

**Key words,** UTI, children, men, women,

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## INTRODUCTION

Background. Urinary tract infection (UTI) is one of the common infections in the Libya community. Distribution and susceptibility of causing pathogens change rendering to period and place. UTI with some pathogenic bacterial strains are one of the most frequent diseases in primary medical care in children and adult men and women with a high amount of morbidity and monetary price, whom treated with antibiotics. The prevalence is highly dependent on age and gender. It has been estimated that 150 million people were infected with UTI annum worldwide which costing global economy not less than 6 billion US dollars (1). Because of the amplified development of resistance, new plans were needed for the treatment of UTI. Diagnostic and use of antibiotics were more specific. UTI are difficult infections, because UTI sick of children, men and pregnant women. Special functional or anatomical features, Immune suppress patients, Urological or renal disease, kidney stones and Status after laying a urine catheter release from an inpatient facility within the previous two weeks (2).

UTI is related with increased health burden among pediatric patients (3). UTI is the most common genitourinary tract disease and the second most common bacterial infection (after respiratory tract infections) in childhood. Gram-negative bacteria are the most common cause of UTIs that may affect the upper or lower urinary tract (4).

The aims of this study are determine the relationship between UTI and gender and age by determine the prevalence of UTI in children, men and women, and observe the more common pathogenic bacteria in UTI.

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Also, to determine the antimicrobial susceptibility of pathogenic bacteria.

## Materials and Methods

### Materials

Study area, The data of the present article had taken from the recorders of medical laboratory of urine cultures and sensitivity of Zawia's hospital, Zawia city in Libya. Study target, UTI patient's children, women and men.

Study period. The data of these recorders were in the period between 1/1/2011 and 31/12/2011 Study Population. The number of urine samples recorded in medical laboratory 527 of patients, divided into three divisions as fallow division of children, division of women and division of men.

### Research questions

Q1. Which division is more infected than other divisions?

Q2. What are more common bacteria in UTI in all divisions?

Q3. What are antibiotics more effect on pathogenic bacteria?

### Sensitivity Test:

The antibiotics used in medical laboratory of Zawia's hospital are Amoxicillin (Amc), Ampicillin (Amp), Azithromycin (AR), Ciprofloxacin (CIP), Cefotaxime (CTX), Ceftazidime (CAZ), Gentamicin (Gm), Ipaten (IPA), Imipenem (IMP), Ofloxacin

(OFX), Oxacillin (OX), Nalidixic acid (NA), Penicilin (Pnc), Sparfloxacin (SPR), Trimethoprim (SXT), and Vancomicin (Va).

## Methods

Calculation the data statistically as fallow. The numbers and percentages of patients; and the Microsoft Excel 2010 were used for graphs and t-test to provide that the hypothesis of differences in means of UTI in children and men and women are a significant in p-value <0.5.

## RESULTS:

### The divisions

UTIs are worldwide diseases effect all ages and both genders male and female with different numbers, in this study, the number of patents were 547, figure 1 showed, one division which is more infected than other two divisions. Where, the distribution of patents as fallow 278(50.5%), 200(36.4%), and 50(13.2%) for children, women and men respectively. By t-test, the null hypotheses of the means are the same as fallow H0: the mean of children = the mean of women, the mean of children

= the mean of men and the mean of men = the mean of women at P value < 0.05. Where, the alternative hypotheses of the means are the not equal as fallow H0: the mean of children  $\neq$  the mean of women, the mean of children  $\neq$  the mean of men, and the mean of men  $\neq$  the mean of women at P value < 0.05.

When compare between the means of children and the means of women, the software showed 0.6686138 which is more than P value 0.05 so the null hypotheses rejected and the alternative hypotheses of the means are accepted.

Also, when compare between the means of children and the mean of men, the software showed 0.225616 which is more than P value 0.05 so the null hypotheses rejected; but the alternative hypotheses of the means are accepted.

On the other hand, when compare between the means of men and the mean of women the software showed 0.2417067 which is more than P value 0.05 so the null hypotheses rejected; as well as the alternative hypotheses of the means are accepted.

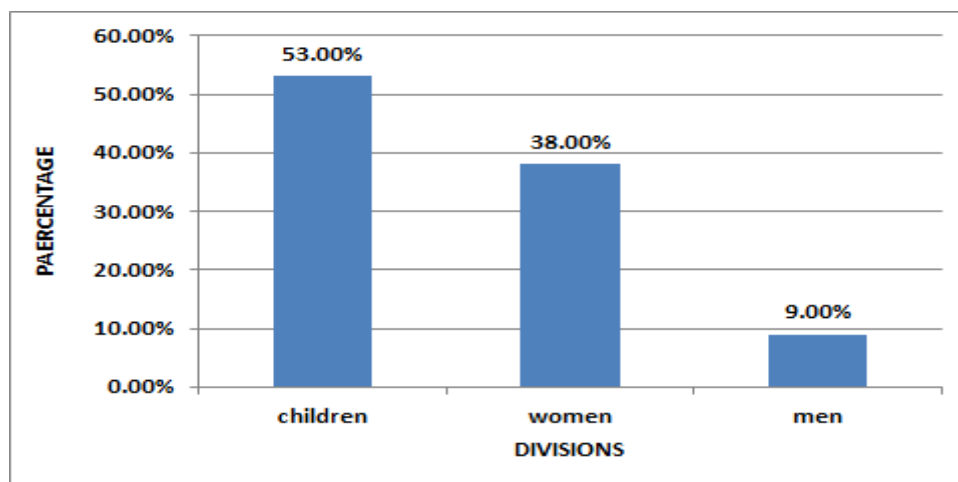


Figure 1. The percentage of patients in each division

### The common bacteria in UTI in all divisions:

The pathogenic bacteria which defined in all urine samples of divisions under study were *Acinetobacter baumannii*, *Citrobacter braakii*, *Citrobacter freundii*, *Citrobacter koseri*, *Enterobacter cloacae*, *Enterobacter faecium*, *Enterobacter faecalis*, *Enterobacter gergoviae*, *Escherichia coli*, *Klebsella oxytoca*, *Klebsella pneumoniae*, *Morganella morganii*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Kluyvera ascorbata*, *Serratia marcescens*,

*Staphylococcus agalactiae*, *Staphylococcus aureus*, *Staphylococcus haemolyticus*, and *Staphylococcus warneri*.

By t-test The figures 2, 3, 4 and 5 showed the higher number of bacterial type effected on both children and women division patients were *E. coli* 191(35.0%) and 111(20.3%) respectively. But, *E. coli* were effected on men division patients very low 17(0.03%). The second higher effected bacteria in UTI of all divisions were *K. pneumoniae* 49(0.09%), 28(0.05%), and 15(0.03%) women, children and men respectively.

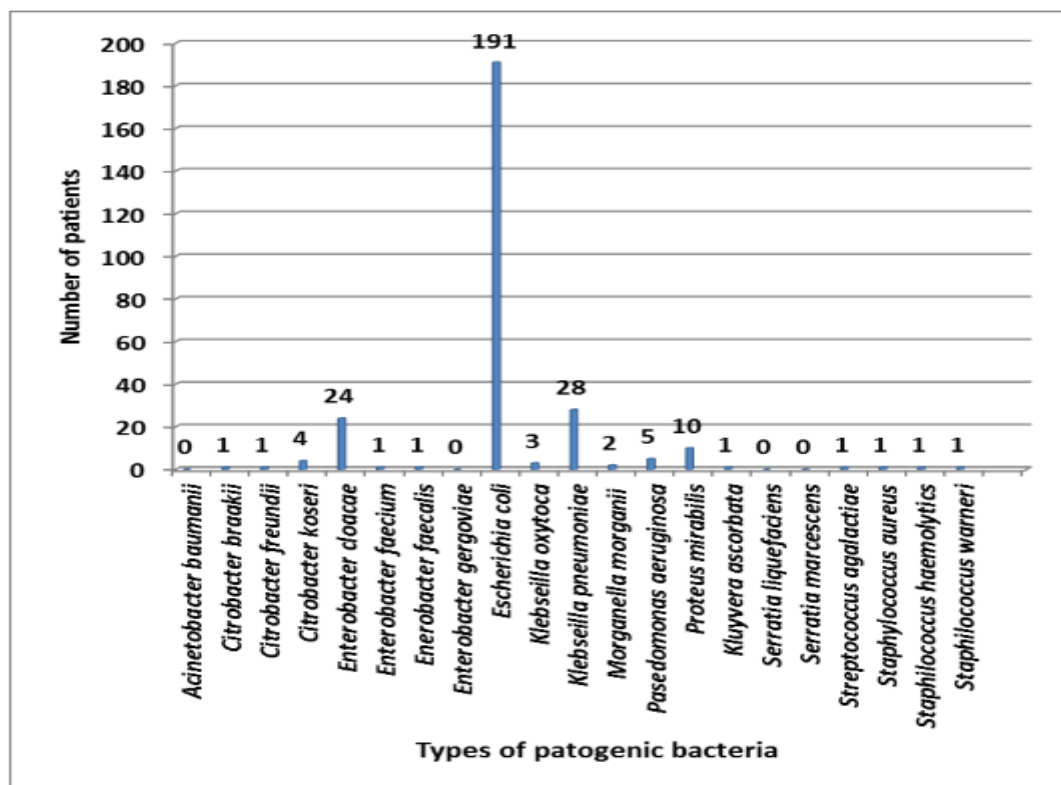


Figure 2. The numbers of children patients in each type of bacteria



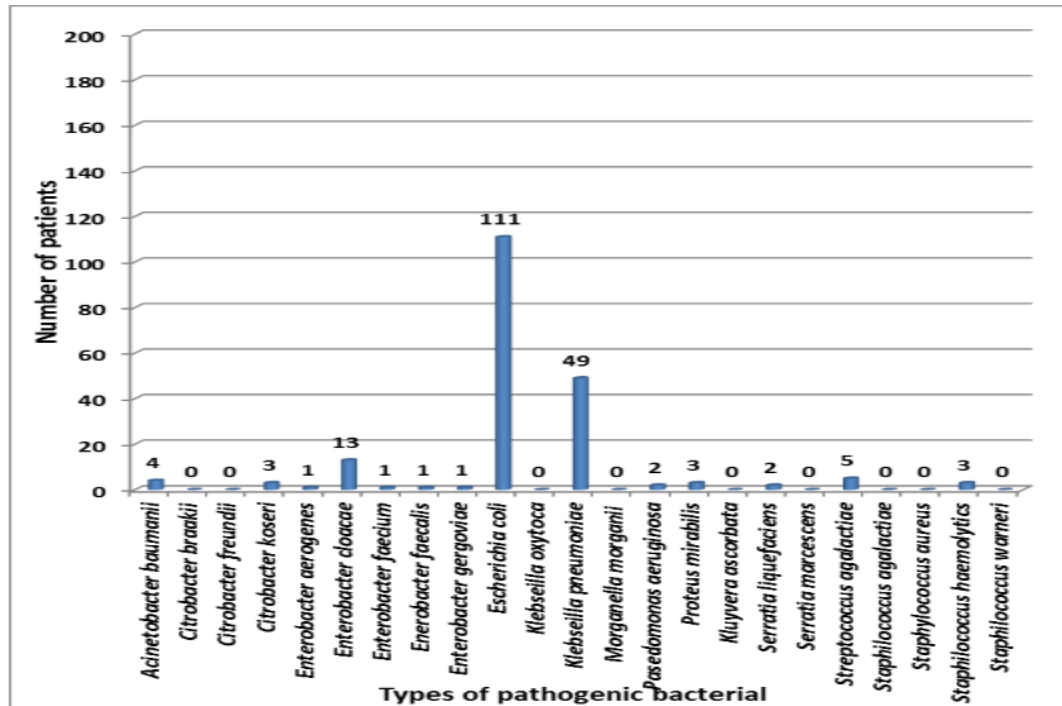


Figure 3. The numbers of women patients in each type of bacteria

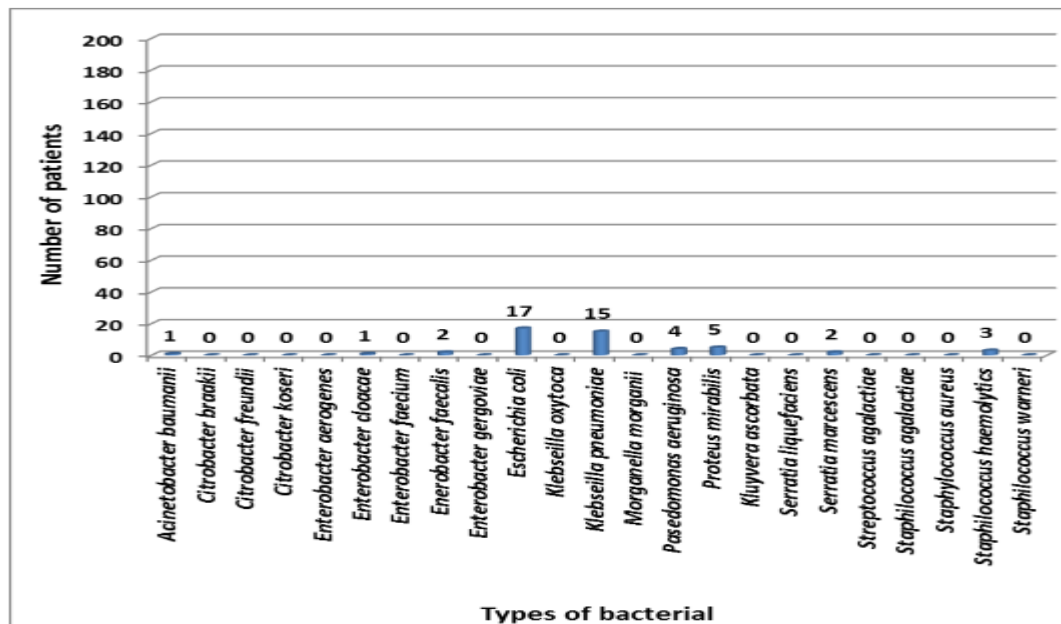




Figure 4. The numbers of men patients in each type of bacteria

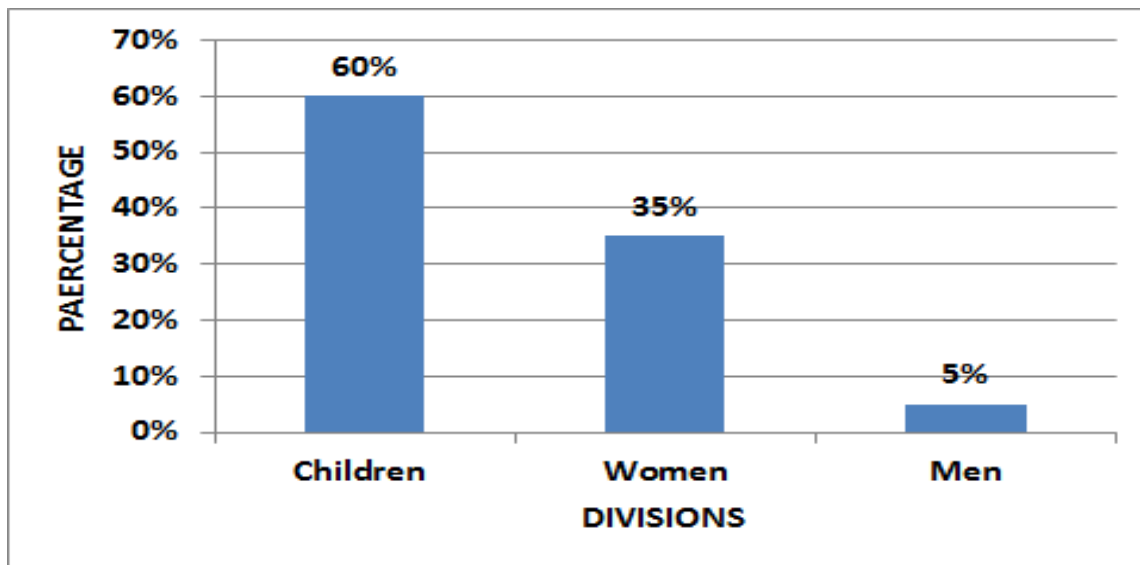


Figure 5. The percentage of divisions infected with *E. coli*

The higher number of patents infected with *E. coli* in all divisions but with different percentages as showed in figure 5; which showed 60% of children were infected with *E. coli* the women were less than children which equal approximately 35% of all effected women; but the men were few approximately 5%.

### The sensitivity to antibiotics

The resistant of bacteria to antibiotics rise day by day due to no control on the usage of antibiotics.

Table 1. Sensitivity test of the important pathogenic bacteria to antibiotics

Bacterial type	Sensitivity to	Resistant to
<i>E.coli</i>	Cip, AR, NA, Ipm, Amc, CTX, Gm, Cno, Amp.	CAZ, IPA, IMP, OFX, OX, Pnc, SPR, SXT, Va.
<i>K. pneumonia</i>	Cip, AR, NA, Ipm, Amc, CTX, Gm, SXT, IPA.	Amp, CAZ, IMP, OFX, OX, SPR, Va.
<i>P. aeruginosa</i>	CTX, Cip, Amc, SXT, Ipm, AR, Gm.	Ox, NA, Va.
<i>K. oxytoca</i>	CTX, SXT, Cip, AR, NA.	Amp.
<i>E. cloacae</i>	Cip, Gm, AR, NA, Ipm, SXT, Amc, CTX.	Amp, Amc, CTX, SXT.
<i>P. mirabilis</i>	CTX, SXT, Cip, AR, NA, Gm, Amp	SXT.
<i>S. marcescens</i>	CTX, SXT, Cip, AR, NA, Gm,	Amp, Amc
<i>C. koseri</i>	Cip, AR	Amp, Amc, SXT, CTX, NA

Table 1 showed the types of important pathogenic bacterial and their sensitivity to

some antibiotics. Which detected that bacteria were sensitive to some antibiotics

and resist to the others; all types of important pathogenic bacteria were sensitive to both antibiotics Cip and AR. In addition to last antibiotics E. coli, K. pneumonia, P. aeruginosa and S. marcescens were also sensitive to CTX, Amc, SXT, Ipm, and Gm. In opposite to these pathogenic bacteria, some pathogenic bacteria appearance resistant to some antibiotics as follow; K. pneumonia, K. oxytoca, E. cloacae, S. marcescens and C. koseri appearance resistant to Amp.

## DISCUSSION

All patients are divided into three divisions, as follow, children, women and men. The total number and percent of these categories are children more than women and women are more than men. In this study the prevalence of UTI women were more than men this was agree with the study done by Sherkatolabbasieh et al 2020; whom found the prevalence of UTI was higher in girls than boys, which is a known risk factor (4). This results of immune compromised of children and women.

Some pathogenic bacteria have resistant to some antibiotics, which was like look one issue that has been seriously considered recently is the resistance of microorganisms to common antibiotics, which appears to be an important factor in community health and treatment (5). This resistant may be due to the irregular usage of antibiotics.

The present study, patients of three divisions were more infected with E. coli and K. pneumonia in contrast with Pohl et al 2020 whom have been established UTI patients were more infected Lactobacillus

and Streptococcus (6). Also, the same study added women had higher abundance of Lactobacillus and Prevotella than men. This different between these studies may be because the other study was on few samples.

Shalaby et al. (7) found that mean age was not meaningfully diverse between the UTI patient group and the control group; the two groups were matched for age, which was consistent with our study. They also reported that the statistical distribution of the two groups was not homogeneous, indicating a significant difference, which is consistent with the higher prevalence of UTIs in girls in our study.

According to Langley (8), the sex ratio for UTIs varies according to age group, with boys at a fivefold greater risk to acquire UTI in the first 3 months of infancy. The outcomes of

our study indicated female sex to be a risk factor of infection.

## CONCLUSIONS

In conclusion, According to the findings of this study, there was no significant relationship between UTI of children and women and men.

All pathogenic bacterial types were sensitive to both antibiotics Ciprofloxacin and Azithromycin

## RECOMMENDATIONS

- Focused on UTI of children and women because they are more infections than men.
- Control the usage of antibiotics to prevent the increased of bacterial resistant to antibiotics.
- More researches about UTI are required

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