

Bacteriological Study of Urinary Tract Infection Among Women in AL Khums, Libya

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Abstract

Background: Bacterial urinary tract infections (UTI) are among the most common infections in worldwide. among different patients, women infection is the higher. This study aimed to determine the bacterial agents of women with urinary tract infection from al khums city in Libya, and testing the susceptibility of bacterial strains isolated from patients visited the Soug Alkamees Central Hospital

Methods: During February 2021 to April 2021 and using standard microbiological techniques, we examined 120 urine specimens collected from women with UTI and 30 specimens from women without UTI as control. The BD Phoenix Automated Microbiology System were used to identify and determine the susceptibility of bacterial isolates against antimicrobial agents. Our results were collected and analyzed using SPSS version 20 software. P - value ≤ 0.05 was considered statically significant.

Results: We detected a causative agent in 53/120 patients (44.2%).The most frequently isolated uropathogenic bacteria from women with urinary tract infection were *Escherichia coli* 19/53 (35.8%), *klebsiella pneumonia* 14/53 (26.4%) and *Enterococcus faecalis* 9/53 (17 %). Bacterial isolates showed very high resistant rates (100%) to different antibiotics. On the other hand, all strains were susceptible to another antibiotics.

Keywords: urine; Escherichia; uropathogenic; women; Libya.

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Introduction.

Urinary tract infection (UTI) may be defined as an infection caused by the presence of microorganisms that can occur anywhere in the urinary tract. Urinary tract infections are among the most common bacterial infections in humans. Worldwide, about 150 million people are diagnosed with UTI each year (Stamm and Norrby 2001, Ala-Jaakkola *et al.*,2022) People of all ages may be infected by uropathogenic microorganisms. However, women, especially after menopause are more vulnerable to the infection compared to men, due to a shorter urethra, pregnancy, absence of prostatic secretion and easy contamination by normal flora of fecal in the urinary tract (Shaikh *et al.*, 2008 and Beerepoot *et al.*, 2011). UTI is the second most common reason for empirical antibiotic treatment, so that it is a major driver of antibiotic usage globally (Rané *et al.*, 2006). Uropathogens have developed high levels of antibiotics resistance. Antibiotics resistance leads to some difficulties in the treatment of UTI with increasing

patient morbidity and costs of re-treatment (Wagenlehner and Naber, 2006). The incidence of bacterial urinary tract infections in the community ranging from asymptomatic to severe sepsis (Hussain, 2001). More than 95% of urinary tract infections are caused by a single bacterial species. Different species of gram negative and positive bacteria have been recognized as an important pathogen, where they were isolated from 80-85% and 15- 20% of UTIs respectively. Among Uropathgens, *E. coli* is the most frequent pathogen (Gales *et al.*, 2002 and Amin *et al.*, 2009).

Methods.

Patient and collection of samples.

During February 2021 to April 2021 120 urine specimens collected from women with clinical signs and symptoms of UTI who were hospitalized in Soug Alkamees Central Hospital. All Patients were diagnosed by having one or more of the following symptoms(dysuria, frequency, urgency, suprapubic discomfort or flank pain). 30 specimens were collected from women without UTI as control. The age of the patients ranged from 18 to 81 years. Approximately, 20 ml midstream urine was collected from each patient in a sterile container, placed on an ice bag and transported immediately to the microbiology laboratory for analysis within two hours of collection.(Sahn *et al.*, 2001 and Khosbakht *et al.*, 2008)

Microbial procedures.

All the samples were cultured on MacConkey Agar, blood agar, and nutrient agar using a sterile calibrated loop (0.001 ml) and incubated at 37°C for 18-24 hours. The number of colony-forming units per milliliter (CFU/ml) was counted. The urine samples giving ≥ 10000 CFU/ml were considered significant (Mahmood *et al.*, 2012). The BD Phoenix Automated Microbiology System were used to identify and determine the susceptibility of bacterial isolates against antimicrobial agents. The BD Phoenix Automated Microbiology System (PAMS), MSBD Biosciences, Sparks Md, USA) provides antimicrobial susceptibility testing (AST) results for antimicrobials as susceptible (S), intermediate susceptible (I) and resistant (R) and is interpreted according to CLSI criteria (CLSI, 2009)

Statistical analysis.

Result of this study were analyzed using SPSS version 20 software. P-values less than 0.05 were considered statistically significant.

Results and Discussion

UTIs are the most frequent bacterial infection seen in the outpatient setting: 1 in 3 women will develop a UTI requiring antibiotic treatment by age 24, and 50% experience at least 1 UTI during their lifetime (Beerepoot *et al.*, 2011). previous study found that almost all women who exhibited symptoms of UTI, but had a negative urine culture, actually had infection.(walker and writer, 2017) According to the results of cultures and the total 150 urine samples (120 with UTI and 30 without UTI) in the current study, it was revealed that the positive result were recorded in 53 (44.2%) and 2 (6.7%) of urine samples collected from women with UTI and women without UTI(controls) respectively figure 1. similar prevalence rates of positive result, among patients with UTI have been reported from different regions. (Ali *et al.*, 2016) determined the prevalence of uropathogenic bacteria in patients with UTI infection in Zliten, Libya. They reported that 434/1165 (37.25%) of cultures of UTI samples were positive. in eastern Libya reported a lower prevalence rate for positive results (27.68%) (Agila *et al.*, 2018). Collectively, the findings of the present work and the above mentioned studies seem to suggest that empirical treatment is sometimes necessary. However, in order to get specific result two consecutive urine samples for culture is needed (Nicolle *et al.*, 2019).

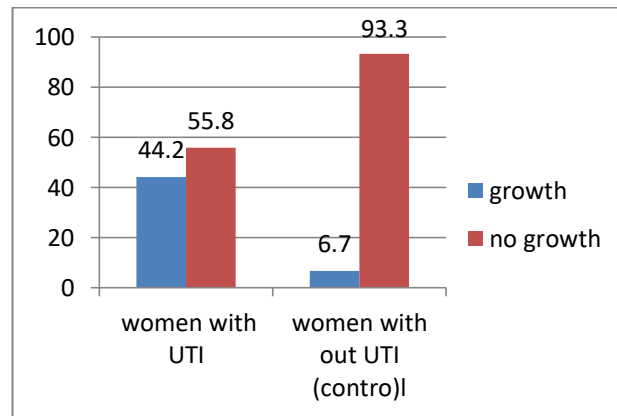


Figure 1. Result of culture for all samples obtained from patient (n =120) and control (n=30).

Different species of enteropathogenic bacteria are known to cause UTIs worldwide. *Escherichia coli* is the predominant etiological agent in community practice. Other bacterial agents include species of Klebsiella, Pseudomonas, Proteus, Enterobacter, Staphylococcus, Streptococcus and *Enterococcus faecalis* (Nicolle, 2001, Gupta *et al.*,2002 and Hudson *et al.*, 2022). Several studies have demonstrated geographical variability of pathogen occurrence in the case of UTI among patient populations (Amin *et al.*, 2009 and Nerurkar *et al.*, 2012). Results of this study showed that, Gram-negative bacilli isolated accounted for 33/53 (62.3%) of the positive cultures, while Gram-positive cocci were 20/53 (37.7%).

The frequency of bacterial isolated is given in table 1. The most common isolated uropathogens in Gram-negative bacilli were *E. coli* 19/53 (35.8%) followed by *Klebsiella pneumonia* 14/53 (26.4%). Of the Isolated gram-positive cocci, 9/53 (17%) were identified as *Enterococci faecalis*, coagulase-negative staphylococci, 9/53 (17%). No significant differences were found in the isolation rates of most pathogens in relation to the old of patients ($p.v > 0,05$). However, stratification of the uropathogens-infected women by age revealed that the isolation of uropathogenic bacteria was more common among women < 50 years of age

Table 1. Bacterial isolates of positive UTI cultures in women (n=53)

Bacterial Pathogens	No. (%)
<i>Escherichia coli</i>	19(35.8)
<i>Klebsiella pneumonia</i>	14 (26.4)
<i>Enterococcus faecalis</i>	9(17)
<i>Staphylococcus. epidermidis</i>	6 (11.3)
<i>Staphylococcus haemolyticus</i>	3 (5.7)
<i>Staphlococcus Aureus</i>	2(3.8)

According to the results, this study demonstrated that the positive isolated pathogens responsible for UTI showed that the proportion of gram negative bacteria was higher than Gram-positive pathogens. *Escherichia coli* was the predominant etiological agent (35.8%) amongst the gram negative bacilli, *Klebsiella. pneumoniae* being the second commonest in the patient group. Similar findings were found in previous study carried out in different regions from Libya and the world (Gupta *et al.*, 2002, Nerurkar *et al.*, 2012, Nahab *et al.*, 2022, Agila *et al.*, 2018). In another study, *Klebsiella* was found to be the commonest followed by *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* (Bajaj *et al.*, 1999). The prevalence of Gram-positive cocci was not high in our study and less than gram negative bacteria; this is similar to other studies in different countries (Tayebi *et al* 2014 and Kothari *et al.*, 2008 , Agila *et al.*, 2018, Nahab *et al.*, 2022). However, different results have been reported (Shahina *et al.*, 2011.). In our study, among gram positive cocci, *Staphylococcus spp* (20.75%) were the most common bacteria isolated from urine samples which is in agreement with the findings of others (Khoshbakht *et al.*, 2008 Agila *et al.*, 2018, Nahab *et al.*, 2022). The differences and similarities in the type and distribution of causative agents of UTI may result from geographical variability, host factors, and practices of people such as education programmers and healthcare, hygiene practices and socioeconomic standards in different geographic regions and countries. However, it was reported that the most bacteria causing UTI are commensals perianal and vaginal regions therefore, personal hygiene may be important in reducing the incidence of UTI.

In this study, the incidence of UTI was ranged in patients between 18 to 81 years old. most of uropathogens were isolated from women under 50 years of age (92.5%) compared to other patients groups (> 50 years, 7.8%) Relationship between age group and the number of infections is showed in figure 2. This finding confirmed the reports of patient with UTI in other cities of Libya, such as Zliten and Tobruk (Ali *et al*, 2016, Agila *et al.*, 2018). Similar results were reported in previous study that was conducted in Kuwait (Dimitrov *et al.*, 2001), Nigeria (Omigie *et al.*, 2009, Ogbukagu *et al.*, 2016 and Nahab *et al.*, 2022). This can be explained by the fact that the changes in the sexual activity, pregnancy, and menopausal status have a high impact on the risk for UTI occurrence since all of them affect the urogenital bacterial composition (Tutuncu and Ardic, 2005 Sewify *et al.*, 2016). On the other hand, the other studies were done in India (Prakash and Saxena, 2013)

showed that the highest incidence of UTI was recorded among the age group > 45 years (63.5 %) and lowest among the other age groups.

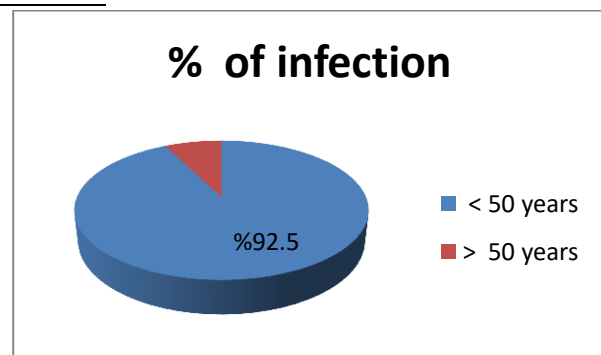


Figure 2. Relationship between age group of women with UTI and the number of infections.

Bacteria causing urinary tract infections have developed a high level of antibiotic resistance. Antibiotic resistance leads to some difficulties in the treatment of UTI. (Wagenlehner and Naber, 2006.). previous studies showed that some strain of uropathogenic *E. coli* (sequence type 131 (ST131)) often exhibit high levels of resistance to multiple antibiotics and have undergone rapid intercontinental dispersal during the last two decades (Peirano and Pitout., 2010 and Pitout, 2012). Monitoring of antimicrobial susceptibility can aid clinicians for prescription of appropriate antibiotics and prevention of development of drug resistance. Our result showed that Bacterial isolates showed very high resistant rates (100%) to different antibiotics. *E. coli* isolates showed very high resistant rates being 100% to Ampicillin and Cephalothin. Of 12 isolated

staphylococcus spp (3 *staphylococcus.aureus* , 3 *staphylococcus haemolyticus* and 6 *staphylococcus epidermidis*) 100% were resistant to Ampicillin and Penicillin G. On the other hand, all strains were susceptible to another antibiotics. which is in agreement with the findings of others (Ali *et al*, 2016 and Agila *et al.*, 2018). However, more detailed results will be published in a subsequent paper regarding the alternative options.

Conclusion.

This study explored the most prevalent UTIs causing pathogens among women. Our results indicate that Gram-negative bacilli were responsible for UTIs. The most common isolated bacteria from UTIs was *Escherichia coli*. In this study, most of the infections in women occurred in the age group of 18-50 years. Therefore, for women whose UTIs are coincident with active age , hygiene care, can be effective in preventing infections. Due to increasing antibiotic resistance among UTI pathogens, an alternative strategy for the prevention of chronic and recurrent UTIs is needed.

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