

Medical Microbiology

Prevalence of Urinary Tract Infections Among Patients Attending Arriada Laboratory in Alzawia City, Libya

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ARTICLE HISTORY

Received 12 February 2024

Revised 11 May 2024

Accepted 21 May 2024

Online 28 May 2024

KEYWORDS

Urinary Tract Infection;
Escherichia coli;
Prevalence;
Alzawia City;
Libya.

ABSTRACT

Urinary tract infection is a persistent global problem that can affect all ages. It affects women more than men due to anatomy and physiological function. It is also considered as common cause of hospital visits. Bacteria are the main causative agents of these infections, although more rarely, other microorganisms, such as fungi and some viruses, have been reported to be responsible for UTIs. The aim of this study was to determine the prevalence of UTI and identify causative microbe and associated risk factors associated among patients attending Arriada Laboratory in Alzawia Libya. A total of 203 morning mid-stream urine samples were examined using standard microbiology methods. The questionnaire was submitted to all patients to collect information such as age, gender, marital and occupational status. Patients who have UTI due to bacterial infection were 61/203 (30%). The most common bacterial isolates were *E. coli* with 36/61 (59%), followed by *Klebsiella pneumoniae* 18/61 (29.5%), *Pseudomonas aeruginosa* 5/61 (8.2%) and *Proteus mirabilis* 2/61 (3.3%). Our study showed a significant relationship between the age and UTIs ($P < 0.05$). In the age group 21-30 prevalence of bacterial causing UTIs were higher with 18/61 (29.5%) compared to other age group ≥ 60 which was 1/61 (1.6%). there was no-significant association ($P > 0.05\%$) between UTIs and sex, marital and occupational status.

دراسة مدى انتشار التهابات المسالك البولية في المرضى المترددین على مختبر الريادة في مدينة الزاوية، ليبيا

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المخلص	الكلمات المفتاحية:
التهابات المسالك البولية تعتبر من أكثر الإصابات الشائعة في العالم والتي تصيب كل الأعمار، هذه الإصابة تعد أكثر شيوعاً في النساء عنها في الرجال وذلك نتيجة للاختلافات في التركيب الفسيولوجي والتشريحي للجسم. وكذلك تعتبر من أكثر الأسباب لزيارة المستشفى. تعد البكتيريا أحد أهم الميكروبات التي تؤدي إلى الإصابة بالتهابات المسالك البولية وكذلك بعض أنواع الفطريات والفيروسات من الممكن أن تؤدي إلى حدوث الإصابة. الهدف من هذه الدراسة هو معرفة مدى انتشار التهابات المسالك البولية، التعرف على الميكروبات المسببة للعدوى وكذلك عوامل الخطر المرتبطة بالتهابات المسالك البولية في الأشخاص المترددین على مختبر الريادة في مدينة الزاوية، ليبيا. تم جمع 203 عينة بول من منتصف مجرى البول في وعاء محكم الإغلاق وتم التعامل مع العينات تبعاً للطرق القياسية المستخدمة في معمل الأحياء الدقيقة. كذلك تم الحصول على بعض البيانات المرتبطة بالتهابات المسالك البولية من المرضى عن طريق تعبئة استبيان يحوي العمر، الجنس، الحالة الاجتماعية، المهنة. أظهرت النتائج أن معدل انتشار التهابات المسالك البولية في المرضى المترددین على مختبر الريادة في مدينة الزاوية، ليبيا كانت 61/203 (30%)، أكثر أنواع البكتيريا شيوعاً كانت <i>Escherichia coli</i> 36/61 (59%)، تليها بكتيريا <i>Klebsiella pneumoniae</i> 18/61 (29.5%)، <i>Pseudomonas aeruginosa</i> 5/61 (8.2%) و <i>Proteus mirabilis</i> 2/61 (3.3%) في هذه الدراسة أظهرت النتائج فروق معنوية ذات دلالة إحصائية ($p < 0.05$) لارتباط متغير العمر مع الإصابة بالتهابات المسالك البولية. في المرحلة العمرية 21-30 سنة انتشار التهابات المسالك البولية يعتبر أعلى 18/61 (29.5%) بالمقارنة بالمرحلة العمرية أكبر من 60 سنة والتي كانت 1/61 (1.6%) ولا توجد فروق معنوية لارتباط ($P > 0.05\%$) بين الإصابة بالتهابات المسالك البولية والجنس، الحالة الاجتماعية، المهنة.	التهابات المسالك البولية الإيشيريشيا القولونية انتشار مدينة الزاوية ليبيا

Introduction

Urinary Tract Infection (UTI) is one of the most widely recognized illness in people with different etiological agents. Every year the UTIs affect 250 million individuals around the world [1]. UTIs is significantly increasing the morbidity and

mortality rate and need a serious public health concern. Consistently individuals infected by UTIs are around 150 million world widely, and spending 6 billion US dollars [2]. However, the most common bacterial infection which infect people are urinary tract, next to respiratory tract diseases [3].

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Although the ladies are more common infected [4] but the men can also get the infection and the disease can be detected in all age groups. Moreover, the Urinary tract infection may be thought of as nosocomial or community acquired. It is believed that most urinary tract infections develop and are acquired from the surrounding area and the mechanism behind the acquisition of microbe is still largely unknown, albeit most cases have been remembered to arise sporadically [2]. Additionally, the UTIs can be acquired during hospitalization and the patient may get the infection during catheterization because of urinary catheters which may be contaminated. Hospital acquired (known as health care associated infections) is considered recently as a major health care problem and that is because of antimicrobial resistance which may deteriorate the patient condition [5]. Either symptomatic or asymptomatic Urinary Tract Infections may occur and the symptoms may be acute or chronic and are either uncomplicated or complicated. A few factors can be influence on the clinical sign of UTIs like; causative agents, severity of the bacterial disease and the ability to immune reaction [6]. Symptoms of UTIs include; fever, consume during urinating, suprapubic pain and arrangement of blisters and ulcers in the genital region. The age and infected area in the urinary tract can be effect on appearance of these different symptoms [7].

Over 95% of UTIs occurs by bacteria [8]. And both gram negative and gram-positive bacteria can cause this kind of infection. However, other member of the family *Enterobacteriaceae* (i.e., *Klebsiella*, *Proteus*, *Citrobacter* and *Enterobacter* spp.), and *Pseudomonas species*, *Enterococcus species*, *Staphylococci* and *Streptococci* [9] have also been isolated from the patients with UTIs.

Age, sex, catheterization and hospitalization can be effect on the relative frequencies of the pathogens [10 -11]. low financial status, increasing age, multiparty, sexual behavior, urinary tract abnormalities, past therapy for Urinary Infection, other clinical problems like diabetes, sickle cell illness and immune compromised states like AIDS, spinal cord wounds and ladies in menopause age are all predisposing factors to Asymptomatic Bacteriuria (ASB) [12]. 25% of Patients who have asymptomatic urinary bacteria infection, will seem suggestive urinary tract infection (cystitis, pyelonephritis) than those without [13]. Increase the risk of incessant UTIs are accepted to many factors [14], urogenital tract anomalies, urinary catheter [15-16], new born children, elderly, pregnancy and clinic (department). Lately, Bladder and Bowel Dysfunction (BBD) and defects in natural resistance, may enhance the recurrence of UTI more than other factors [17].

This study aimed to found out the prevalence of UTI among patients attending Medical Arriada laboratory in Al zawia, Libya. In addition, we focused in this study on the causative agent as well as the risk factors which may associated with UTI.

MATERIALS AND METHODS

Study Design and Area

A cross-sectional study was carried out in Arriada laboratory, Libya, from May 2023 to Dec 2023.

Inclusion and Exclusion Criteria

In this study we focused on patients who were suspected to have UTI by visiting clinician. All patients with no history of antibiotic intake for at least two weeks were included in this study.

The study excluded female patients who were in their menstruation period, and patients with history of antimicrobial drug therapy in the last two weeks.

Data Collection and Processing

the questionnaire was submitted to all patients to collect information such as age, gender, marital and occupational status, and counseling for specimen collection. Patients were instructed on how to collect the specimens and all data were kept confidential.

Collection of Samples

Two hundred and three (203) morning midstream urine samples were collected from patients who attended to Arriada Laboratory in Alzawia, Libya, in sterile bottles. Collected urine was examined within 3 hours in the bacteriology laboratory for diagnosis of the uropathogens and the result of the examination was added to the questionnaire.

Isolation and Identification of Uropathogens

Identification of the bacterial uropathogens was done at microbiology laboratory. Each sample of midstream urine was inoculated on CLED agar (Cystine Lactose Electrolyte Deficient) and incubated at 37°C for 24 h. After incubation, cultures were sub-cultured on blood agar and MacConkey agar media, positive UTI was recorded upon the appearance of 100,000 Colony Forming Units (CFU) per milliliter on blood, MacConkey agar. Identification of bacteria was established based on their gram staining and morphology as well as on biochemical tests such as Urease, Citrate and Indole [18].

Data Analysis

Data were statistically analyzed using SPSS version 27 to obtain the prevalence rate of urinary tract infection, frequency of causative agents and the mean of age. UTI results were divided into presence or absence of the disease and tested against suspected factors like age, sex, marital and occupational status associated with UTI. Where the chi-square (χ^2) and probability value (p) were calculated for the test of significance. The p-value of ≤ 0.05 was considered statistically significant.

RESULTS

Two hundred and three (203) urine samples were collected from patients attending to Arriada Laboratory in Alzawia, Libya, who suffering from UTIs. Sixty- one sample 61/203 (30%) had significant bacteriuria. In this study, patients age distribution ranged from 1 year to 83 years with age mean of 28.02 ± 16.678 years. Most of the patients were females 152/203 (74.9%). And the majority in this study were married 111/203 (54.7%).

According to statistical analysis: age was found to be statistically significant ($P < 0.005$). However, sex, marital, occupational status were not statistically significantly associated with occurrence of UTIs (Table 1).

The prevalence of UTIs was higher in females 51/61 (83.6%) than in male 10/61 (16.3%). However, gender was not significantly associated with UTIs. The infection was higher among married patients, though statistical analysis did not show a significant association between marital status and UTIs

Table 1: demographic characteristics of patients attending Arriada laboratory. (n=203).

variables	Categories	frequency	Percentage(%)	χ^2	p
sex	Male	51	25.1	2.15	0.7
	Female	152	74.9		
Age	Mean \pm SD	28 \pm 16.67		16.4	0.02
marital	Single	92	45.3	1.8	0.7
	Married	111	54.7		
Occupational status	Child	16	7.9	18.9	0.2
	Student	65	32		
	Employs	83	40.9		
	House sitting	33	16.3		
	Retired	6	3		

(χ^2)*=chi square – P= probability value – SD= standard deviation.

The prevalence of UTI was higher among age group (21-30 years) compared to age group \geq 60 years, which means that the incidence of UTI decrease by the age. (Table 2)

Table 2: Prevalence of UTI according to age of patients attending Arriada laboratory (n=203).

Age group	No of isolates	percentage(%)	Female N (%)	Male N(%)
1-10	13	21.3	7(54.5%)	6 (14%)
11-20	9	14.8	0 (0%)	9 (18%)
21-30	18	29.5	2 (18.2%)	16 (32%)
31-40	9	14.8	1(9.1%)	8 (16%)
41-50	7	11.5	1 (9.1%)	6(12%)
51-60	3	4.9	1 (9.1%)	2 (4%)
61-70	1	1.6	0(0%)	1 (2%)
71-80	1	1.6	0 (0%)	1 (2%)

Urinary Tract Infections are mainly occurred by bacteria and the results showed that 61 midstream urine samples were contain four bacterial uropathogens of which *Escherichia Coli* was the most common isolate 36/61 (59 %) followed by *Klebsiella Pneumoniae* 18/61 (29.5%), *Pseudomonas. Aeruginosa* 5/61 (8.2%) and *Proteus. Miribalis* 2/61 (3.3%) (Table 3).

Table 3: distribution of bacterial uropathogen isolates from patients presenting Arriada laboratory. (n=203).

No	Uropathogens	Female n, (%)	Male n, (%)	Total
1	<i>Escherichia.coli</i>	30(83.3%)	6 (16.7%)	36(59%)
2	<i>Klebsiella.pneumoniae</i>	16(88.9%)	2(11.1%)	18(29.5%)
3	<i>Pseudomonas.aerugina</i>	4(80%)	1(20%)	5 (8.2%)
4	<i>Proteus miribalis</i>	1(50%)	1(50%)	2 (3.3%)

DISCUSSION

This study conducted to determine the prevalence rate, causative agent and factors associated with urinary tract infections in patients attending to Arriada laboratory in Alzawia, Libya. Our analysis showed the prevalence rate of bacterial urinary tract infection was 61/203(30%). Similar findings have been reported in previous study conducted in Erbil city which reported a prevalence rate of 22% (110/500) [19]; in Chittagong- Bangladesh the prevalence was 25.91% (507/1957) [20]; and in Oman the prevalence was 27.73%

(155/559) [21]. In this study, the prevalence of UTIs was found to be higher than that reported in previously studies conducted in Saudi Arabia, (10.67%) [22]; in Ethiopia, (9.2%) [23]; and in Iran (7.8%) [24]. While it was lower than the prevalence rates found in previous studies in in Baghdad, Iraq (40.19%) [25]; and in Uganda, (38.8%) according to study done by [26]. These differences may be due to either a variation occurred in the sample size, region, or community customs and traditions, personal hygiene level, or education level.

The highest prevalence of UTI was in females (83.6%) as compared to males (16.3%), Moreover, a high prevalence rate (29.5%) was found among females in the reproductive age (21-30 years) which correlates with findings from other studies which revealed that the frequency of UTI is greater in females compared to males [27, 28]. The reason behind of the high prevalence of urinary tract infection in females is the close proximity of the urethral with anus, wider and shorter urethra, incontinence and less acidic pH of vaginal surface and poor hygienic conditions [29]. Higher prevalence of urinary tract infection in married patients (57.3%) than unmarried (42.6%), was also observed in this study and that is because association between sexual behavior and UTI or may be due to the urethra is close to the anus [30,31].

The relation of age to UTI was also been observed in this study where highest prevalence of microbial isolates was observed in reproductive age group and this might be due to active sexuality of the age group [32] Similar report also indicated that age [33] found to be significantly related to UTIs. Sex, Marital status and Occupational status were the common risk factors but were not significant. Similar study done by [34] found that the illiteracy, sexual activity, low socio-economic level and past history of UTI as risk factors for UTI. Periodic health examination and awareness programs can help to improve the health status as well as quality of life. Similarly, there is need to raise awareness of UTI for prevention of UTI by maintaining hygienic conditions and regular medical examination.

UTIs are caused by a variety of microorganisms, including gram negative bacteria. The *Enterobacteriaceae* family were the most common microorganism isolated of Urinary tract infection in present study accounting (30%) of total isolated bacteria and amongst them *E. coli* was the most predominant bacteria with (59%) followed by *Klebsiella pneumoniae* (29.5%). which was similar to previous studies in Libya and other countries [37-39]. In Northwest Libya, *Escherichia coli* (56%) and *Klebsiella pneumoniae* (19%) were found to be predominant isolated organisms from UTIs patients [35]. In a study conducted in Tripoli reported predominance of *E. coli* (49.68%) and *Klebsiella pneumonia* (18.20%) [36]. In another study in Messalata, Libya, reported the predominance of *Escherichia coli* (56%) and *Klebsiella pneumonia* (17%) [37]. In Southern Tunisia, researchers have found *Escherichia coli* (68%) and *Klebsiella pneumonia* (13%) as predominance uropathogens among patients with UTIs [38]. A study in Iran has reported uropathogens with a predominance of *Escherichia coli* (38%) because *E. coli*, *Klebsiella* and *Proteus* considered as normal flora in intestinal while if present in urinary tract it will causing UTIs [39].

While a low occurrence was seen with bacteria like *Pseudomonas aeruginosa* (8.2%) and *Proteus mirabilis* (3.3%). this result is in agreement with studies had done in France about the UTI in community, which showed that the lowest isolated pathogens were *Enterobacter*

spp., *Pseudomonas aeruginosa* and *Proteus mirabilis* [27-29]. In Tobruk, Libya, the most isolated uropathogen in UTI patients were *E. coli* followed by *klebsiellae spp.*, *Proteus spp.*, while *Pseudomonas spp.* was less common [40].

CONCLUSION

Escherichia coli was the major cause of urinary tract infections with (59%). The age is considered as an important associated with UTI. Appropriate measures may help reduce urinary tract infection by knowing the factors associated with this infection. Successful infection prevention and control measures may reduce the transmission of the nosocomial pathogen and decrease the morbidity rate, we recommend a routine screening for patients, these routine checks can achieve prevention of urinary tract infection at a lower cost.

ACKNOWLEDGEMENT

This work used data obtained through the Arriada Laboratory in Al zawia, Libya therefor, the authors would like to thank the management and employees in Arriada Laboratory, Alzawiya, Libya for their valuable assistance and suggestions.

Author Contributions: "All authors have made a substantial, direct, and intellectual contribution to the work and approved it for publication."

Funding: "This research received no external funding."

Data Availability Statement: "No data were used to support this study."

Conflicts of Interest: "The authors declare that they have no conflict of interest."

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