

# The prevalence of urinary tract infection, or urosepsis following transrectal ultrasound-guided prostate biopsy in a subset of the Saudi population and patterns of susceptibility to fluoroquinolones

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## ABSTRACT

**الأهداف:** دراسة انتشار مضاعفات زيادة معدلات التهابات المسالك البولية UTI و / أو الإلتان الثانوي بسبب خزعة المستقيم الموجهة بالأشعة فوق الصوتية للبروستاتا TRUS، ومسببات الأمراض المعنية وأنماط المقاومة للمضادات الحيوية في ليف من مرضانا

**الطريقة:** هذه دراسة وصفية من فوج متتالية من المرضى الذين خضعوا لخزعة المستقيم الموجهة بالأشعة فوق الصوتية للبروستاتا (TRUS) في مدينة الملك عبدالعزيز الطبية بمدينة الرياض، المملكة العربية السعودية خلال الفترة من يناير 2012م و ديسمبر 2014م باستخدام المضادات الحيوية الوقائية الموصى بها. وكانت المتغيرات شملت التركيبة السكانية المرضى، نوع من العلاج الوقائي بالمضادات الحيوية، نتائج العينة، ومعدل التهاب المسالك البولية وإلتان بولي مع نوع من البكتيريا المعنية و حساسيتها لمضادات الميكروبات.

**النتائج:** استخدمت إحصاءات وصفية بسيطة في ما مجموعة 139 مريضاً على التوالي. تمت مصادفة إلتان بولي تتطلب دخول المستشفى في 7 (5%) و لوحظ التهاب المسالك البولية غير معقد في 4 (2.8%). وكانت مسببات الأمراض الأكثر شيوعاً كولاي (90.1%) والمكورات العنقودية الذهبية (9.1%). وقد لوحظ المقاومة للسيبروفلوكساسين المستخدم كوقاية بشكل روتيني في 10 من هؤلاء المرضى (90.9%).

**الخاتمة:** تعد هذه الدراسة من الدراسات المعاصرة القليلة في منطقتنا تظهر زيادة في معدل المضاعفات المعدي بعد TRUS البروستاتا كما لوحظ في أجزاء أخرى كثيرة من العالم. وينبغي اعتبار هذا في تقديم المشورة للمرضى لخزعة TRUS ومراجعة المضادات الحيوية الوقائية الروتينية.

**Objectives:** To study the prevalence of urinary tract infections (UTI), or sepsis secondary to trans-rectal ultrasound-guided (TRUS) biopsy of the prostate, the pathogens involved, and patterns of antibiotic resistance in a cohort of patients.

**Methods:** This is a descriptive study of a consecutive cohort of patients who underwent elective TRUS biopsy at King Abdulaziz Medical City Riyadh, Saudi Arabia between January 2012 and December 2014. All patients who underwent the TRUS guided prostate biopsy were prescribed the standard prophylactic antibiotics. Variables included were patients' demographics, type of antibiotic prophylaxis, results of biopsy, the rate of UTI, and urosepsis with the type of pathogen(s) involved and its/their antimicrobial sensitivity.

**Results:** Simple descriptive statistics were used in a total of 139 consecutive patients. Urosepsis requiring hospital admission was encountered in 7 (5%) patients and uncomplicated UTI was observed in 4 (2.8%). The most common pathogens were *Escherichia coli* (90.1%) and *Klebsiella pneumoniae* (9.1%). Resistance to the routinely used prophylaxis (ciprofloxacin) was observed in 10 of these patients (90.9%).

**Conclusion:** This showed an increase in the rate of infectious complications after TRUS prostate biopsy. Ciprofloxacin resistance was found in 90.9% of patients with no sepsis.

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The incidence of prostate cancer is increasing worldwide at a rate of 2-3% each year.<sup>1</sup> In the United States of America (USA), it is the most common type of cancer in men.<sup>1</sup> In Saudi Arabia, prostate cancer accounts for 6.3% of the newly diagnosed cancers per year; it is the sixth most common cancer amongst Saudi men of all ages and the most common in these  $\geq 75$  years of age.<sup>2</sup> Trans-rectal ultrasound-guided (TRUS) biopsy of the prostate is the mainstay of diagnosis of prostate cancer. It is estimated that 553,000 to 992,000 biopsies are performed each year in the USA alone.<sup>3</sup> There are certain complications associated with this procedure, which include hematuria, hematospermia, urinary retention, urinary tract infection, and urosepsis.<sup>4,5</sup> In the past 10 years, many studies have shown an increased rate of hospitalizations after TRUS guided prostate biopsy secondary to infectious complications in spite of the routine use of prophylactic antibiotics.<sup>1,4,6</sup> This issue is poorly studied in our region; therefore, we conducted this study in a subset of patients seen in our tertiary care center to examine the prevalence of UTI and urosepsis, the pathogens involved and patterns of resistance to the routinely used prophylactic antibiotics.

**Methods.** We designed a retrospective chart review using consecutive sampling and obtained approval from the institutional review board. The inclusion criteria were all adult patients ( $\geq 18$  years) undergoing a TRUS guided prostate biopsy at King Abdulaziz Medical City, Riyadh, Saudi Arabia between January 2012 and December 2014. Patients not fulfilling the inclusion criteria were excluded.

All patients who underwent the TRUS guided prostate biopsy were prescribed the standard prophylactic Ciprofloxacin 500 mg orally every 12 hours for 5 days starting the night before the scheduled biopsy. Patients were educated on the possible complications and their symptoms, and instructed to report back to the hospital if they developed any of them; otherwise they were followed up routinely a 2 weeks after the biopsy. Patient with symptoms and signs of UTI, or urosepsis, underwent a urine culture and sensitivity, blood culture, and sensitivity and complete blood and differential count, then appropriate treatment was initiated.

Data were entered and analyzed using the Statistical Package for Social Sciences Version 23.0 software (IBM

Corp, Armonk, NY, USA). Simple descriptive statistics were used to report patient demographics, prevalence of UTI, and urosepsis, causative pathogens, and antibiotic susceptibility.

**Results.** A total of 139 consecutive patients were included. Demographic data are shown in Table 1. Patients who were high risk for post TRUS biopsy infection such as those with previous history of infection had a culture carried out before undergoing TRUS biopsy. Fifty-two patients had a culture before carrying out the biopsy. Six (4.3%) patients had a culture positive for *Escherichia coli*. One patient (0.7%) was positive for *Pseudomonas aeruginosa*. Negative culture was the result in 45 patients (32.4%). The remaining 87 patients (66.6%) did not undergo pre-TRUS biopsy cultures. Twenty nine patients (21%) were worked up for symptoms suggestive of UTI, or urosepsis out of which, 4 (2.8%) had uncomplicated UTI, and 7 (5.0%) had urosepsis with positive blood cultures requiring hospitalization and treatment with intravenous antibiotics. The most common pathogens were *Escherichia coli* (90.1%) and *Klebsiella pneumoniae* (9.1%). Resistance to the routinely used prophylaxis ciprofloxacin was observed in 10 patients (90.9%), and antibiotic susceptibility is summarized in Tables 2 & 3.

**Discussion.** Our study is one of few contemporary series in the region reporting the rate of infectious complications and antibiotic susceptibility after TRUS guided prostate biopsy. The rate of urosepsis requiring hospitalization in 5% of our patients and the substantially high rate of resistance to the standard prophylactic ciprofloxacin are both alarming. In the past 10 years hospitalizations after TRUS guided prostate biopsy were shown to be significantly increasing.<sup>7-9</sup>

**Table 1** - Demographic data of 139 patients who underwent trans-rectal ultrasound-guided biopsy of the prostate?

Age	Values
Mean	64.47
Median	66
Standard deviation	11.48
Minimum	25
Maximum	100
Range	25-100
Interquartile range	14

**Disclosure.** Authors have no conflict of interests, and the work was not supported or funded by any drug company.

**Table 2** - Antibiotic-based sensitivity and resistance of 139 patients who underwent trans-rectal ultrasound-guided biopsy of the prostate.

Antibiotic	Frequency (%)
<i>Sensitive</i>	
Nitrofurantoin	171 (63.6)
Gentamicin	16 (54.5)
Amikacin	4 (36.4)
Ceftriaxone	4 (36.4)
Ampicillin	3 (27.3)
Amoxicillin	2 (18.2)
Trimethoprim-Sulfamethoxazole	1 (9.1)
Cifotaxime	1 (9.1)
Imipenem	1 (9.1)
Cefazolin	1 (9.1)
Meropenem	1 (9.1)
<i>Resistance</i>	
Ciprofloxacin	11 (100)
Trimethoprim-Sulfamethoxazole	6 (54.5)
Gentamicin	4 (36.4)
Ampicillin	3 (27.3)
Nitrofurantoin	2 (18.2)
Amikacin	1 (9.1)
Cefotaxime	1 (9.1)
Cefazolin	1 (9.1)

**Table 3** - Organism-based sensitivity and resistance of 139 patients who underwent trans-rectal ultrasound-guided biopsy of the prostate.

Organism/antibiotic	Sensitive (%)	Resistant (%)
<i>Escherichia coli</i>		
Ciprofloxacin	0	10 (100)
Amikacin	4 (100)	0 (0)
Ceftriaxone	4 (100)	0 (0)
Amoxicillin	2 (100)	0 (0)
Meropenem	1 (100)	0 (0)
Imipenem	1 (100)	0 (0)
Nitrofurantoin	7 (87.5)	1 (12.5)
Gentamicin	6 (66.7)	3 (33.3)
Ampicillin	3 (50)	3 (50)
Cifotaxime	1 (50)	1 (50)
Cefazolin	1 (50)	1 (50)
Trimethoprim-Sulfamethoxazole	1 (16.7)	5 (83.3)
<i>Klebsiella pneumoniae</i>		
Amikacin	0 (0)	1 (100)
Ciprofloxacin	0 (0)	1 (100)
Gentamicin	0 (0)	1 (100)
Nitrofurantoin	0 (0)	1 (100)
Trimethoprim-Sulfamethoxazole	0 (0)	1 (100)

Nam et al,<sup>4</sup> showed that the rates of hospitalization after TRUS guided prostate biopsy in the province of Ontario, Canada increased from 1-4.1% from 1996 to 2005, and mostly the causes of hospitalizations (71.6%) were due to infection-related complications.<sup>4</sup> In another study by Feliciano et al<sup>6</sup> in a subset of patients from the USA, the incidence of hospitalization after TRUS biopsy increased by 3-folds from 2004 to 2006. A previous study<sup>1</sup> reported a 6.2% rate of hospitalization due to infectious complications after TRUS guided prostate biopsy in a tertiary hospital in Lebanon. Reasons for the increasing rates of infectious complications following TRUS prostate biopsy are, due to the increase in multi-drug resistance. Overwhelming evidence through published literature<sup>10,11</sup> is showing a continuous increase in resistance to the routinely used prophylactic ciprofloxacin. The resistance rates of *Escherichia coli* species in urine culture were reported to range between 20-57%,<sup>12-15</sup> while in our study these rates were much higher reaching up to 90.9% of patients with positive urine, or blood cultures. The higher rate of infection, sepsis, and resistance to antibiotics in our cohort could be explained by the unfortunate fact that there is a common misuse of antibiotics in our community through self-medication and prescription by non-qualified pharmacists.<sup>16,17</sup> Other contributing

factor may be food contamination with multidrug resistant microbes.<sup>18</sup>

**Study limitations.** Limitations include the retrospective data collection and being a single-center study. Future studies should be prospective and population-based.

In conclusion, this showed an increase in the rate of infectious complications after TRUS prostate biopsy. Ciprofloxacin resistance was found in 90.9% of patients with no sepsis. This should be considered in counseling patients for TRUS biopsy and in revising our routine prophylaxis antibiotics regimens. We recommend a further investigation of this study in a population-based study.

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