

Urinary tract infections in general practice in a rural community in South Trinidad

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ABSTRACT

Objective: A prospective study was carried out at a General Practice in South Trinidad, to assess the sensitivity profiles of urinary isolates in this remote rural community.

Methods: Quantitative bacteriologic cultures were performed according to standard procedures. Identification of isolates was based on gram reaction, morphology and biochemical reactions. Susceptibility testing was carried out using commonly prescribed antimicrobials for the treatment of urinary tract infections.

Results: From 779 urine specimens, 49% were culture positive for counts $\geq 10^5$ organisms per ml. Three hundred and eighteen were aged 21 years and above and 85.5% of these were females. The lowest incidence of urinary tract infections, 8%, was seen among the 13-20 year old age group. Most males above 50 years had indwelling urethral catheters due to prostatic disease. *Escherichia coli* was the predominant isolate, 71%, followed by *Proteus mirabilis*, 9%, and *Klebsiella pneumoniae*, 7%. All urinary tract infections isolates were fully sensitive to ofloxacin and >96% (except for *Citrobacter species*, 63%) were sensitive

to cefuroxime. Apart from *Enterococcus faecalis* and *Staphylococcus saprophyticus*, the overall sensitivity to ampicillin by all isolates was <33%. The prevalence of multi-resistant *Pseudomonas aeruginosa* in community-acquired urinary tract infections is increasing. All *Pseudomonas aeruginosa* were fully sensitive to gentamicin and ofloxacin.

Conclusion: The high frequency of single and multiple antibiotic resistances in this rural community should cause alarm. The ease of procuring antibiotics in these areas without a prescription can result in uncontrolled self-medication. Also, the absence of antibiotic prescribing policies and inadequate information on patterns of bacterial resistance, may all contribute to the emergence of resistant strains.

Keywords: Urinary tract infections, catheter-associated urinary infection, community-acquired urinary infection.

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Bacterial infections of the urinary tract (UTI) have been reported in hospital and community situations.^{1,2} In the community the prevalence has been reported in all age groups and in both sexes. In women between the ages of 16-35 years, the prevalence of UTI is approximately 20%,³ and the major risk factors in this age group appear to be sexual intercourse and the use of the diaphragm and spermicide.^{4,5} Among young men who develop uncomplicated UTI, homosexuality as a result of

exposure of the urethra to *Escherichia coli* (*E.coli*) during receptive rectal intercourse, lack of circumcision and human immuno-deficiency virus (HIV) infection, are important risk factors.^{6,7} The prevalence of bacteriuria is approximately 1% in schoolgirls, but rare in elementary school-age boys.⁸ In the elderly the incidence of UTI increases sharply in both sexes, and rates of 17%, 55% and 15%-31% have been reported in women and men.^{9,10} Urinary pathogens, especially from community patients, have

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been known to include strains that are resistant to many of the commonly used antibiotics.¹¹ Data on the patterns of resistance in most developing countries is inadequate. In Trinidad and Tobago, little is known about the resistance patterns of urinary pathogens isolated from patients in rural communities. This study reviews the susceptibility profiles of urinary isolates from patients who were seen in a general practice in a small rural community of Southern Trinidad over a 12-month period.

Methods. This survey occurred in a small general practice over a 12-month period, January 1, 1998 to December 31, 1998, in a rural district about 15 km outside the city of San Fernando, Trinidad. Trinidad is the larger of the twin-island Republic, Trinidad and Tobago, which is located about 11 km off the northern coast of Venezuela, in South America. The population of the Republic is about 1.25 million people. Patients seen in this practice include diabetics, hypertensives, those for antenatal care, arthritis, others with acute upper respiratory tract problems, sexual transmitted diseases, acute urine retention due to prostatic disease, and minor surgical, dermatological and gynecological matters. Patients with suspected UTI were instructed in the method of midstream urine (MSU) collection (posters in the collection areas re-inforce the method). Specimens were collected in wide mouth screw-on-top containers and stored at 4°C until transported to our laboratory in Eight-quart Coleman coolers. Quantitative bacteriologic cultures were performed according to standard laboratory procedures.¹²

All samples were processed within one hour after arriving at the laboratory. A standard calibrated platinum wire loop delivering 0.001 ml of uncentrifuged urine was used to inoculate sheep blood agar (SBA) and cysteine lactose electrolyte deficient (CLED) media. These plates were incubated aerobically at 35-37°C for 18-24 hours.

Specimens of urine containing $\geq 10^5$ organisms per ml of a single species were considered as having significant bacteriuria. Wet preparations were made from centrifuged samples and casts, leukocytes and erythrocytes per high power field were looked for. A rapid dipstick (Combur 10 test, Boehringer Mannheim, Diagnostics and Biochemicals, East Sussex, United Kingdom) was also used to detect pyuria via leukocyte esterase activity.¹³ Identification of organisms was based on gram reaction, morphology, and biochemical characteristics. Antimicrobial susceptibility was performed via the disc diffusion technique using antibiotic discs containing the following concentrations: ampicillin (10µg), cephalexin (30µg), co-trimoxazole (trimethoprim-sulfamethoxazole (25µg), nitrofurantoin (300µg), ofloxacin (5µg), gentamicin (10µg) and cefuroxime (30µg)

Results. A total of 779 urine specimens were submitted for culture and of this, 381 (49%) were positive. *E.coli* was the most frequent isolate, 71% (269/381), followed by *P.mirabilis*, 9% (36/381), and *K.pneumoniae* 7% (27/381) (Table 1). All isolates were fully sensitive to ofloxacin, and more than 96% (except for *Citrobacter*, 63%) were sensitive to cefuroxime. A part from *E.faecalis* and *S. saprophyticus*, the overall response to ampicillin by all isolates was less than 33%. *P.aeruginosa* isolates were susceptible to gentamicin and ofloxacin, the latter antibiotic being introduced in the country during the latter part of 1997.

Table 2 shows the distribution of urinary tract infections according to age and gender. The lowest incidence of urinary tract infections was seen among the 13-20 years age group closely followed by the 0-12 year old patients. Approximately 83.5% of the 381 patients with UTI were 21 years and older and 85.5% (272/381) of cases in that age group were females. About 83.5% of UTI among the 0-12 age

Table 1 - Antimicrobial susceptibility patterns of bacterial isolates from urine of patients with community-acquired tract infections in Southern Trinidad, 1998.

Organsims	Number of Isolate	Percentage Susceptible to:						
		SXT	F/M ²	CF ³	AM ⁴	GM ⁵	CXM ⁶	OFL ⁷
<i>Escherichia coli</i>	269	81	97	98	48	100	100	100
<i>Proteus mirabilis</i>	36	53	0	75	64	56	100	100
<i>Klebsiella pneumoniae</i>	28	63	70	78	0	89	96	100
<i>Enterococcus faecalis</i>	15	7	100	NT	100	93	NT	100
<i>Staphylococcus saprophyticus</i>	13	100	100	100	86	89	100	100
<i>Citrobacter species</i>	8	100	100	75	0	100	63	100
<i>Staphylococcus aureus</i>	6	67	100	67	50	83	100	100
<i>Pseudomonas aeruginosa</i>	6	NT	NT	NT	NT	100	NT	100

Note ¹SXT = co-trimoxazole (trimethoprim-sulfamethoxazole); ²F/M = nitrofurantoin; ³CF = cephalothin; ⁴AM = ampicillin; ⁵GM = gentamicin; ⁶CXM = cefuroxime; ⁷OFL = ofloxacin; NT = not tested

Table 2 - Age and gender distribution of urinary tract infection (UTI) cases at a general practice in Southern Trinidad, 1998.

Age (years)	Total UTI cases No (%)	Males No (%)	Females No (%)
0-12	34 (9)	6 (11.5)	28 (8.5)
13-20	29 (8)	0	29 (8.5)
≥ 21	318 (83.5)	46 (88.5)	272 (83)
TOTAL	381 (100.0)	52 (100.0)	329 (100.0)
UTI = urinary tract infection			

group were females. No UTI was seen among males in the 13-20 age group. Throughout this study males accounted for only 14% of all UTI cases seen in this general practice.

Discussion. Although the spectra of bacterial isolates may be similar, the pre-dominant organisms associated with UTI vary. In this study, the majority (80%) of the urinary isolates were *E.coli* (71%) and *P.mirabilis* (9%), a finding comparable to reports by Gruneberg,¹⁴ and Bavernfeind et al.¹⁵ It is therefore evident that the predominant organisms associated with UTI are gram-negative bacteria belonging to the family *Enterobacteriaceae*. These organisms are part of the normal flora of the gastrointestinal tract. The short female urethra and the proximity of the anus to the urethra make females more prone to bacterial infections, due to colonization of the anterior urethra and the vaginal introitus. This may then partly account for the higher prevalence and incidence of UTI in females. Also, other predisposing factors of UTI include clinical conditions as pregnancy, prostatic disease, hydronephrosis, urethro-pelvic stenosis and constipation.^{16,17}

Several reports have shown that the incidence rates for UTI vary with age and sex, with a higher incidence occurring in those over 20 years of age.^{5,17,18} Our results indicate that the incidence in adult females was about 6 times higher than males of similar age. The great majority of males with UTI in this study, 96%, had indwelling urethral catheters due to prostatic disease and only came to this practice because the hospital was too far away. These men were either unfit for surgery, refused surgery or there was a long waiting list for surgery.¹⁹

The antibiotic in-vitro susceptibility testing showed that co-trimoxazole and ampicillin are unlikely to be effective in treating patients with UTI due to *P.mirabilis*, *E. coli* and *S.aureus* in this community as these organisms showed relatively low sensitivity to these drugs. Improper use of antibiotics often facilitates the selection of resistant bacterial

strains. The more antibiotics are used in the community the more likely it is that resistant strains will be selected and maintained in that environment.²⁰ In Trinidad and Tobago, self medication with easy-to-obtain over the counter drugs such as co-trimoxazole and ampicillin, are very common. The inadequate dosage of these antibiotics used in self-medication, along with the wide spread use in animal feeds of antibiotics to improve livestock are important contributors to the development of resistant strains to these drugs in the community.

The rural areas of south Trinidad are heavily populated and not well staffed by doctors. Because of poverty, the health centers in these areas are usually heavily attended and some times the doctor only spends a few hours there and leaves, thus putting tremendous financial pressure on patients who desperately need help to visit the general practitioners practice. The high resistance rate of uropathogens to some of the commonly used oral antimicrobial agents as seen in this study, has influenced the introduction of the use of relatively new antibiotics such as cefuroxime and ofloxacin into the country, which may produce higher cure rates as evidenced by in-vitro testing against more than 98% of urinary isolates in this study.

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