

Antimicrobial resistance of bacterial isolates from urinary tract infections at Felege Hiwot Referral Hospital, Ethiopia

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Abstract

Urinary tract infections are common health problems and vary according to geography and regions. A retrospective analysis was conducted to determine the antimicrobial resistance of bacterial isolates from urine at Felege Hiwot Referral Hospital from September 2003 to June 2008. From 529 urine specimens, bacterial isolates were found in 160 [(30.2%) (95% CI: 26.3-34.1%)]. Of these, 116 (72.5%) of the isolates were gram negatives. Single and multiple drug resistance to the commonly used antibiotics were high among bacterial isolates in the area. Thus, rational use of drugs should be practiced. [*Ethiop. J. Health Dev.* 2009;23(3):236-238]

Introduction

Urinary tract infections (UTIs) caused by bacteria associated with an increased antimicrobial resistant species are common in all age groups (1). Most urinary tract infections are initiated by organisms that gain entrance from the natural environment to the bladder through the urethra and are more common in women than men (2). Urinary pathogens vary depending upon age, sex, catheterization, hospitalization and previous exposure of antimicrobials (3). The prevalence of antimicrobial resistance with urinary tract infection is increasing and varies according to geographical and regional location (4), therefore up to date information is essential for clinicians for appropriate antimicrobial therapy. To our knowledge, no microbiological data exist from urinary tract infections in Bahir Dar. The purpose of this survey was to determine the antibiotic susceptibility patterns of bacterial isolates from patients with urinary tract infections at Felege Hiwot Referral Hospital, Bahir Dar, Ethiopia.

Methods

This cross-sectional study was conducted based on retrospective review of records of 529 patients for whom urine specimens were processed for culture and susceptibility tests at Bahir Dar Regional Health Research Laboratory from September 2003 to June 2008. Standard operating procedures of Feingold and Martin (5) were followed to isolate and identify the bacteria and data were collected from log book using a format. Urine samples were inoculated on cystine lysine electrolyte deficient (CLED) agar and blood agar plate (Oxoid Basingstoke, UK) using standard 4mm diameter wire loop and incubated at 37°C for 24 hours aerobically.

Records showed that antimicrobial susceptibility test was done on Muller-Hinton agar (Oxoid Basingstoke, UK) with disc diffusion technique of Bauer *et al* (6) against ampicillin (10µg), gentamycin (10µg), penicillin (10IU), tetracycline (30µg), chloramphenicol (30µg), erythromycin (30µg), nitrofurantoin (300µg), cotrimoxazole (25µg), streptomycin (10µg), carbenicillin

(100 µg), cephalotin (30 µg) and norfloxacin (10µg). Reference strains, *E.coli* ATCC 25922 and *S.aureus* ATCC 25923, were used as controls. Ethical clearance was obtained from the ethical committee of Medicine and Health Sciences, Bahir Dar University.

Results

Urine samples from 529 patients were analyzed in the study. Female patients constituted 308 (58.2%). The age range was from 2 months to 89 years. Three hundred sixty eight (69.6%) were from out patients and 161 (30.4%) were inpatients. Bacterial isolates were found in 160 [(30.2%) (95% CI: 26.3-34.1%)] urine specimens, of these 107 (67%) were from females. One hundred sixteen (72.5%) of the isolates were gram negative bacteria. *E.Coli* was the predominant isolate 77 (48%) followed by *S.aureus* 31(19.4%) (Table 1).

Bacterial isolates from patients with UTI showed high levels of single and multiple antimicrobial resistance against commonly prescribed drugs as shown in Table 1. The overall multiple drug resistance was 93.1%, while 2.5% of the isolates were resistant to one antibiotic and 4.4% were sensitive to all antibiotics tested.

Discussion

In the present study, the isolation rate of bacteria was 30.2%. This is in accordance with previous reports from Gondar (7) and Addis Ababa (8). However, it is lower than other previous reports from Gondar of 39.5% (3) and 36.6% (9). We found that 72.5% of the etiologic agents of UTIs were gram negative enteric bacteria, *E .coli* being the most predominant, which is similarly reported elsewhere in the country (7). The prevalence of UTI was higher in female than male patients. This might be due to the fact that shorter, wider urethra and its proximity to the anus is the predisposing factor for infection. The isolation rate of *S.aureus* (19.4%) is higher compared to the reports of Gondar which was 9.7 % (9), 14.5 % (7), 18 % (3).

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Table 1: Resistance pattern of bacterial urine pathogens isolated in Felege Hiwot Referral Hospital, North West Ethiopia from September 2003 to June 2008.

Organisms	No (%)	Antibiotics tested No (%)												
		Amp	Gen	Pen	TTC	CAF	ERY	S	SXT	CB	KF	Nor	F	R ₂
<i>E.coli</i>	77(48.0)	64(83.1)	22(33.8)	-	51(66.2)	44(57.1)	13(16.9)	54(70.1)	35(45.5)	22(28.6)	40(51.9)	7(9)	6(7.8)	73(94.6)
<i>S. aureus</i>	31(19.4)	16(51.6)	4(16.1)	19(61.3)	23(74.2)	14(45.2)	6(19.4)	18(58.4)	9(29)	11(35.5)	11(35.5)	4(12.9)	5(16)	30(96.7)
Citrobacter spp	13(8.0)	11(84.6)	3(23)	-	9(69.2)	3(23)	7(53.8)	7(53.8)	8(61.5)	4(30.8)	5(38.5)	2(15.4)	-	12(92.3)
CNS	10(6.3)	4(40)	-	8(80)	5(50)	5(50)	3(30)	4(40)	2(20)	2(20)	4(40)	3(30)	2(20)	9(90)
Kelebsiella spp.	10(6.3)	9(90)	2(20)	-	9(90)	5(50)	3(30)	3(30)	3(30)	3(30)	4(40)	-	-	8(80)
Proteus spp	6(3.8)	5(83.3)	2(33.3)	-	4(66.7)	3(50)	1(16.7)	3(50)	3(50)	2(33.3)	3(50)	1(16.7)	1(16.7)	5(83.4)
Enterobacter spp.	4(2.5)	4(100)	-	-	3(75)	-	-	3(75)	2(50)	-	2(50)	1(25)	1(25)	4(100)
Streptococcus spp.	3(1.9)	2(66.7)	-	2(66.7)	1(33.3)	1(33.3)	2(66.7)	1(33.3)	1(33.3)	1(33.3)	1(33.3)	-	-	3(100)
Pseudomonas spp.	2(1.3)	2(100)	-	-	2(100)	2(100)	-	2(100)	2(100)	-	2(100)	2(100)	-	2(100)
Salmonella spp.	2(1.3)	2(100)	-	-	2(100)	-	-	2(100)	2(100)	-	2(100)	-	-	1(50)
Providenciae spp.	2(1.3)	-	-	-	2(100)	1(50)	1(50)	-	-	-	-	1(50)	-	2(100)
Total	160(100)	119(74)	33(20.6)	29(18.1)	111(69.4)	78(48.6)	36(22.5)	97(60.6)	67(41.9)	45(28.1)	73(45.6)	24(15)	15(9.4)	149(93.1)

Keys: Amp- Ampicillin, Gen- Gentamicin, Pen- penicillin, G, S- streptomycin
CAF- Chloramphenicol, ERY- Erythromycin, SXT- Co-trimoxazole, - - not done
CB- Carbenicillin, Kf- Cephalotin, TTC- Tetracycline, CNS- Coagulase negative Staphylococci
CN- Coagulase negative, Nor- Norfloxacin, F- Nitrofurantoin, R₂- resistant to two and more than two antibiotics

The isolated bacterial species showed a high rate of antimicrobial resistance (95.6%) to commonly used antimicrobial agents. This is consistent with reports of different studies elsewhere in the country (7, 3). The rate of multiple drug resistance (93.1%) is high as compared to other studies, 85.5 % (7) and 68% (3). This may be due to widespread misuse of antibiotics in the area. Our study indicated that the majority of bacterial isolates were sensitive to nitrofurantoin and norfloxacin (Table 1). Thus, these drugs appear to be effective against uropathogens in the study area. In this report, hospital and community acquired UTIs were not separately reported since the clinical information of the patients was not recorded and we could not also control the bacteriological methods. Important data such as the nature of UTI (whether acute or chronic) could not be obtained.

In conclusion, single and multiple drug resistance to the commonly used antibiotics in the area were high. Therefore, antimicrobial surveillance and *in vitro* susceptibility testing with strict adherence to antibiotic policy may help to contain the spreading of drug resistant microbes. Finally we recommended nitrofurantoin and norfloxacin as drugs of choice for the immediate empirical therapy of UTI.

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