

NOSOCOMIAL UROPATHOGENS AND THEIR ANTIBIOTIC SENSITIVITY PATTERNS IN A TERTIARY REFERRAL TEACHING HOSPITAL IN RAWALPINDI, PAKISTAN

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Background: Nosocomial urinary tract infections (NUTIs) are by definition not present at admission of a patient and are acquired during hospitalisation. The objective of this study was to study the uropathogens and their antibiotic sensitivity patterns in hospital acquired urinary tract infections presenting in a teaching hospital. **Methodology:** It was a retrospective descriptive study carried out at the Department of Pathology, Fauji Foundation Hospital, Rawalpindi, Pakistan, during the year 2009. Reports of urine culture and sensitivity performed during one year were retrospectively studied with a view to document various isolates and their antimicrobial sensitivity. **Results:** Out of a total number of 1204 urine cultures submitted, 246 were found to have nosocomial urinary tract infections. Over all prevalence of nosocomial urinary tract infection in the examined reports was 20.43%. **Conclusion:** Nosocomial Urinary tract infections are common. Gram negative bacilli are most frequent uropathogens and are resistant to commonly used antibiotics. Fosfomycin followed by Gentamycin and Cefotaxime were the most effective antibiotics.

Keywords: uropathogens, antibiotics, urine, culture, sensitivity

INTRODUCTION

Nosocomial urinary tract infections (NUTIs) are by definition not present at admission of a patient and are acquired during hospitalisation.¹ Catheterization and instrumentation of urinary tract is the commonest cause of nosocomial UTI.^{2,3,4}

It is important for the doctors to be aware of the prevalence and antimicrobial resistance of uropathogens in nosocomial urinary tract infections.⁵

The purpose of the present study is to document common uropathogens causing hospital acquired urinary tract infections and delineate their antimicrobial sensitivities. This information once conveyed to the doctors involved in the treatment of urinary tract infections shall improve empirical treatment of patients.

METHODOLOGY

All 2204, midstream 'clean catch' or catheter specimens collected during the study period, in wide open, leak proof containers of 20 ml capacity were included in the study. Specimens were processed immediately. The urine samples were inoculated on culture plates and examined macroscopically and microscopically. The culture medium used was CLED (Cystine, Lactose, Electrolyte Deficient) and MacConkey Agar plates. Samples were incubated aerobically at 37 °C for 24–48 hours. Identification and evaluation of positive cultures was done visually and using API ID strips where indicated.

For Positive cultures sensitivity discs were put up on media plates. The plates were incubated at 37 °C. The results of sensitivity were read after 24 hours. Negative cultures were re-incubated for another 24 hours and the report was given as 'No Growth' at the end of 48 hour incubation.

RESULTS

Urine culture and sensitivity reports of 2204 urine samples submitted to laboratory of Fauji Foundation Hospital, Rawalpindi in one year were studied retrospectively. Out of these, 246 patients (20.43%) had nosocomial urinary tract infections. E. coli was the commonest isolate (60.97%) followed by Klebsiella (18.69%). Isolates are listed in Table-1. Eight antibiotics are currently routinely tested to determine sensitivity of common uropathogens. Fosfomycin followed by Gentamycin and Cefotaxime were the most effective antibiotics (Table-2).

Table-1: Microorganisms isolated from patients with nosocomial urinary tract infections (NUTIs)

Organism	Positive Cultures	%
Escherichia Coli	150	60.97
Klebsiella Pneumoniae	46	18.69
Proteus Mirabilis	10	4.06
Pseudomonas aeruginosa	13	5.46
Proteus vulgaris	10	4.06
Staphylococcus Aureus	15	6.09
Acinetobacter	2	0.81

Table-2: Antibiotic susceptibility of microorganisms isolated in nosocomial urinary tract infections (NUTIs)

Antibiotic	<i>Escherichia coli</i>	<i>Klebsiella pneumoniae</i>	<i>Proteus mirabilis</i>	<i>Pseudomonas aureginosa</i>	<i>Proteus vulgaris</i>	<i>Staphylococcus aureus</i>	<i>Acinetobacter</i>
Fosfomycin	95.33	86.95	60	84.61	100	73.33	50
Ampicillin	0	28.26	0	0	0	0	0
Cotrimoxazole	26.66	41.30	20	76.92	0	26.66	0
Ciprofloxacin	30	58.69	50	69.22	25	53.33	0
Doxycycline	13.33	2.17	60	7.69	25	6.66	0
Norfloxacin	20	43.47	30	30	25	26.66	0
Cefotaxime	31.33	39.13	40	61.53	30	26.66	50
Gentamicin	42.66	43.47	50	61.53	40	46.66	0

DISCUSSION

Urinary tract infections are one of the commonest bacterial disease in humans.⁶ Women due to a short urethra and males with congenital or acquired bladder outflow obstruction are more prone to develop urinary tract infections. Intrinsic urinary tract abnormalities predisposing to UTI include enlarged prostate, neurogenic bladder, and fistulas involving urinary tract.⁷

Clinical infection of urinary tract exists when $>10^5$ bacteria/ml of urine are detected in a midstream 'clean catch' urine specimen or from urine specimen collected from a catheter.⁸ Urine culture sensitivity is routinely done and an empirical therapy is started immediately and modified if required once report of culture and sensitivity is available.⁹ Due to excessive use of antimicrobials for all sorts of infections, uropathogens are becoming increasingly more resistant to such antibiotics. Although the common uropathogens remain more or less the same over time they have acquired alarming levels of resistance to the commonly used and readily available less expensive antibiotics.^{10,11} Antibiotic prescription trends in a given hospital have a significant impact on emergence of antibiotic resistance.

Urethral catheterisation and instrumentation related UTI is the most common nosocomial infection in hospitals.¹² Nosocomial bacteriuria or candiduria develops in up to 25% of patients requiring a urinary catheter for more than a week with a daily risk of infection of up to 5%.¹³ Nosocomial catheter associated urinary tract infections increase morbidity, mortality and the ongoing costs of treatment of patients. Many authors have reported higher isolation rates for gram negative uropathogens (93.10%) than the gram positive organisms (6.90%). Prevalence of gram positive organisms varies between 3.3% and 19.0%.^{4,14,15}

Out of 8 commonly tested antibiotics, Fosfomycin exhibited highest sensitivity for all isolates. Other antibiotics had relatively lower sensitivity rates precluding their use as empirical therapy. Amikacin and Carbapenams are not tested routinely. Ampicillin and Doxycycline due to low sensitivity rates should not be used in the empirical treatment of NUTIs.

CONCLUSION

Nosocomial urinary tract infections are common. Gram negative bacilli are most frequent uropathogens and are resistant to commonly used antibiotics. Knowledge of antibiotic sensitivity helps determine choice of antimicrobials till reports of culture and sensitivity is available.

REFERENCES

- Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM. CDC definition for nosocomial infections. *American journal of infection control* 1988;16:128-40.
- Stamm WF. Catheter associated urinary tract infections: Epidemiology, pathogenesis and prevention. *Am J Med* 1991;91(Suppl 3 B):655-715.
- Warren JW. Catheter associated urinary tract infections. *Infect Dis Clin North Am* 1997;11:609-22.
- Davies HD, Jones EL, Sheng RY, Leslie B, Mathlow AG, Gold R. Nosocomial urinary tract infection at a pediatric hospital. *The Pediatr Inf Dis J* 1992;11:349-54.
- Khan S, Ahmed A. Uropathogens and their susceptibility patterns: A retrospective analysis. *J Pak Med Assoc* 2005;51(2):98-100.
- Sharma S. Current understanding of pathogenic mechanisms in UTIs. *Ann Natl Acad Med Sci* 1997;33(1):31-8.
- Nelson DA. Differentiating prostate disorders. *J Am Acad Nurs Pract* 1988;10:415-22.
- Stark RP, Maki DG. Bacteriuria in a catheterized patient. *N Eng J Med* 1984;311:560-4.
- Gruneberg GN. Antibiotic sensitivities of urinary pathogens; 1971-1982. *J Antimicrob Chemother* 1984;14:17-23.
- Farrell DJ, Morrissey I, De Rubies D, Robbins M, Felmingham D. A UK Multicentre study of the antimicrobial susceptibility of bacterial pathogens causing urinary tract infection. *J Infect* 2003;46(2):94-100.
- Gupta V, Yadav A, Joshi RM. Antibiotic resistance pattern in uropathogens. *Indian J Med Microbiol* 2002;20:96-8.
- Kunin CM, Douthitt S, Dancing J, Anderson J, Moeschberger M. the association between the use of urinary catheters and morbidity and mortality among elderly patients in nursing home. *Am J Epidemiol* 1992;135:291-301.
- Stark RP, Maki DG. Bacteriuria in catheterized patient. *N Eng J Med* 1984;311:560-4.
- Ashkenzie S, Tov SE, Samra Z, Dinari G. uropathogens of various childhood populations and their antibiotic susceptibility. *The Pediatr Inf Dis J* 1991;10:742-6.
- Grunberg RN. Changes in the antibiotic sensitivities of urinary pathogens. 1971-1989. *J Antimicrob Chemother* 1990;26:3-11.

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