



Urinary Tract Infection (UTI) In the Elderly - A Clinical and Microbiological Study

Microbiology

Dr. Lalita Verma

Senior Demonstrator, Microbiology, S.M.S. Medical College and Hospital Jaipur

Dr S.S. Dariya

Junior Specialist MD. Medicine S.M.S. Medical College and Hospital Jaipur

Dr. Rajni Sharma

Senior Professor, Microbiology, S.M.S. Medical College and Hospital Jaipur

ABSTRACT

Introduction: Urinary tract infections (UTIs) are more common in geriatrics due to physiological alterations or pathological conditions. Urinary tract infection in the elderly poses a very serious problem.

Aim of the study: The aim of this study was to find out the common presenting symptoms and risk factors associated with UTI in the elderly, also to find the common uropathogens and their antimicrobial susceptibility pattern.

Method: A total of 200 elderly patients aged 65 years and above with symptoms of UTI were included in this observational and descriptive study. A clean catch midstream specimen or catheterised urine specimen was collected and cultured semi quantitatively.

Results: Fever (60/200 = 30%) and Painful burning micturition. (53/200 = 26.5%) were found to be the most common symptoms of UTI in the present study. The results showed that *Escherichia coli* was the most frequently isolated organism (44.79%), followed by *Klebsiella spp* (20.83%), *Pseudomonas aeruginosa* (17.70%), and *Enterobacter spp.* (11.45%).

Conclusion: Patients with diabetes mellitus (DM) often have urinary tract infections. Diabetes mellitus (DM) the most common risk factors associated with UTI in the present study. *Escherichia coli* (42.58%) was found to be the most prevalent gram negative bacteria in the positive urine samples of UTI.

KEYWORDS:

Urinary tract infection (UTI), Geriatrics, diabetes mellitus (DM)

Introduction

Urinary tract infection (UTI) is the second most common infectious complaint in geriatric clinics overall¹. Older adults are more prone than younger individuals to developing urinary tract infections (UTIs) for several reasons, such as diabetes Parkinsonism, Alzheimer's disease or dementia.

The common risk factors for UTI in the elderly are the use of urinary catheters, living in a long-term care facility or nursing home, hormonal factors such as oestrogen deficiency in women, anatomical factors such as an enlarged prostate in men or a cystocele in women, functional factors such as Parkinsonism, Alzheimer's disease or dementia, metabolic factors such as diabetes

The common organisms causing UTI are *Escherichia coli*, *Klebsiella spp.*, *Proteus sp.*, *Staphylococcus aureus* etc. The range of potential uropathogens in elderly patients is considerably broader than in the younger adult population. The elderly patients are also more likely to have asymptomatic bacteriuria as they get older. Antimicrobial resistance among uropathogens is increasing. Extended Spectrum Beta Lactamase (ESBL) producing organisms are frequently resistant to many of the antimicrobial agents usually recommended for the treatment.

The extensive and inappropriate use of antimicrobial agents has invariably resulted in the development of antibiotic resistance which, in recent years, has become a major problem worldwide.

However, there is not much information on the aetiology and resistance pattern of UTI in the elderly in India. This study aimed to find out the common presenting symptoms and risk factors associated with UTI in the elderly. Etiological agents and their susceptibility profiles were also determined.

Materials and Methods

Study population

A hospital based observational and descriptive study was conducted in the Department of Medicine and Microbiology, S.M.S. Medical College and Attached Hospitals, Jaipur, Rajasthan, over a period of one year from March 2015 to February 2016. A total of 200 elderly patients aged 65 years and above with symptoms of UTI (Both Outpatients and Inpatients) were studied. Our exclusion criteria consisted of those patients who were already on antibiotic treatment. The presenting symptoms and risk factors such as diabetes, catheterisation, incontinence, renal stones, immunosuppression etc were identified.

Sample collection and processing

A clean catch midstream specimen or catheterised urine specimen was collected in a sterile, wide-mouth, leak-proof container and immediately send to the laboratory for processing.

Direct microscopy

Wet mount examination was performed to look for the presence of pus cells, epithelial cells, red blood cells, cast, crystals or microorganisms.

Isolation and identification of uropathogens:

A gram stained direct smear of the specimen was examined for the presence of bacteria and pus cells. Using a calibrated loop method, uncentrifuged specimen was streaked onto the MacConkey and Blood agar plates and incubated at 35-37°C for 24 hours. For midstream urine samples, 105 CFU / ml was taken as significant. For catheterised specimens and gram positive bacteria lower colony counts (<105 CFU / ml) were considered significant. The culture isolates were further identified by using various biochemical reactions up to genus/species level. Antibiotic sensitivity testing was done by the Modified Kirby-Bauer disc diffusion method according to the Clinical and Laboratory Standards Institute (CLSI) guidelines³.

Table-1. Frequency of various risk factors in subjects with urinary tract infection.

Risk Factor	Frequency	Percent
Diabetes Mellitus	100	50
Catheterization	35	17.5
Recurrent urinary tract infection	25	12.5
Recent history of uro-genital Instrumentation	20	10
Renal stone	14	7
Immunosuppression	4	2
Incontinence	2	1

Table 2: Distribution of Gram negative, gram positive and yeast isolated from urine samples

Bacterial Isolates	No. of Patients	(%)
Gram negative bacilli (N= 96)	E. coli	43 44.76%
	Klebsiella spp.	22 20.83%
	Pseudomonas	17 17.70%
	Enterobacter	11 11.45%
	Proteus spp.	6 6.25%
	Citrobacter	3 3.12%

Gram positive organisms (n=35)	S. aureus	18	51.43%
	Enterococcus spp	12	34.29%
	Coagulase negative Staphylococcus	5	14.29%
Yeast (n=5)	Candida non-albicans	3	60%
	Candida albicans	2	40%

Results

Total number of patients in this study was 200 out of which 140 (70%) were male and 60 (30%) were female. The mean age of the study population was 70.54 ± 7.09 years, ranging between the ages of 65 and 97 years. Out of the total 200 patients 130 (65%) were inpatients and 70 (35%) were outpatients. Fever was the most common symptom found in the present study. The next common symptom was found to be Painful burning micturition.

Out of the 200 samples subjected for aerobic culture, 136 (68%) samples were culture positive of which, 82 were male and 54 were female. 64(32%) patients were found to be culture negative in this study. Among the 136 culture positive patients, diabetes and catheterisation were the predominant risk factors presented with the UTI patients, (50%) and (17.5%) respectively.

DISCUSSION

The diagnosis of infection in an older patient is often complicated by the lack of typical symptoms and a clear history. The presence of cognitive impairment and communication difficulties can make it difficult to obtain an accurate history. Many older patients have chronic genitourinary symptoms and it is important to recognize that this is not synonymous with infection.

Fever was found to be the most common symptom in the present study which was in concordance with similar other studies conducted by Mahesh E et al., Richardson JP et al⁵ and Chassagne P et al⁶. The next common symptom was found to be Painful burning micturition in our study. However Increased frequency was the most common symptom among acute uncomplicated UTI in a study done by Little et al.⁷ indicate that clinical presentation plays a very minor role, if any, in diagnosing UTI, reconfirming the fact that urine culture is essential to diagnose UTI.

Diabetes mellitus and recent uro-genital instrumentation were the most common risk factors associated with UTI in the present study (Table 1). Patients with diabetes mellitus have a higher incidence of urinary tract infections compared to patients without DM. They also more often have bacteraemia, with the urinary tract as the most common focus for these infections, as well as a higher mortality outside the hospital compared to patients without Dm⁸.

In this study, the Gram negative bacilli constituted 70.59% of the total bacterial isolates while Gram positive cocci constituted 25.74%. *Escherichia coli* (42.58%) was found to be the most prevalent gram negative bacteria in the positive urine samples of UTI. This result is consistent with reports from other studies^{9,10,11}.

Other isolated bacteria from UTI cases in this study were *K. pneumoniae* (18.71%), *P. aeruginosa* (20%), *Enterobacter* spp. (12.5%), *Proteus* spp. (6.98%), and *Citrobacter* spp. (7.10%).

Among the Gram positive organisms, the predominant isolate was found to be *Staphylococcus aureus* (18/35 - 51.43%) followed by *Enterococcus* spp and, coagulase negative *Staphylococcus*, (12/35 - 34.29%) and (5/35 - 14.29%) respectively.

Regarding antimicrobial susceptibility pattern, in our study we found that more than 78% gram negative isolates were susceptible to Imipenem, and around 56% to Amikacin. Around 45 to 60% susceptibility was observed for Nitrofurantoin and Norfloxacin. Similar results have been reported by other studies conducted by Deepti Chaurasia et al¹⁴.

Gram positive uropathogens showed more sensitivity to Nitrofurantoin followed by amikacin and were least sensitive to ampicillin, followed by norfloxacin ciprofloxacin., amoxici llin/cla vulanicacid, and cephalexin Linezolid was found to be most effective drugs among Gram Positive Cocci (100% sensitive). Other studies of Lakshmi narayana S A et al¹³, Deepti Chaurasia et al¹⁴. reported 100% sensitivity to the same.

Other similar studies have revealed varying susceptibility pattern which suggests their local and geographical variation which could be multi factorial. Thus knowing the organisms causing UTI and their susceptibility pattern is of importance to effectively treat these infections and also to formulate an antibiotic policy that may help at times for empirical treatment.

Conclusions

Patients with diabetes mellitus (DM) often have urinary tract infections (UTIs). Diabetes mellitus (DM) the most common risk factors associated with UTI in the present study. It has been suggested that the presence of glucosuria can explain this increased incidence of UTI in elderly with diabetes mellitus. Moreover, this study concludes that *E. coli* and other isolates were more sensitive to imipenem and amikacin compared to the other antibiotics tested and therefore these may be the drugs of choice for the treatment of UTIs in our region.

References

- O'Donnell J, Gelone S, Abrutyn E. Selecting drug regimens for urinary tract infection: current recommendations. *Infect Med* 2002; 19:14-22.
- Goldstein FW. Antibiotic susceptibility of bacterial strains isolated from patients with community-acquired urinary tract infections in France. Multicentre Study Group. *Eur J Clin Microbiol Infect Dis* 2000; 19:112-7.
- Clinical and Laboratory Standards Institute. Performance standards for Antimicrobial susceptibility testing; 16th informational supplement. M100-S16. Clinical and Laboratory Standards Institute, Wayne, PA, 2006.
- Mahesh E, Ramesh D, Indumathi VA, Punith K, Kirithi Raj, Anupama HA, Complicated urinary tract infection in a tertiary care centre in south India, *Alamen journal of medical sciences*; 2010; 3(2): 120-127.
- Richardson JP, Hricz L. Risk factors for the development of bacteremia in nursing home patients. *Arch Fam Med* 1995; 4:785-9.
- Chassagne P, Perol MB, Doucet J, Trivaille C, Ménard JF, Manchon ND et al. Is presentation of bacteremia in the elderly the same as in younger patients? *Am J Med* 1996; 100:65-70.
- Little P, Merriman R, Turner S, Rumsby K, Warner G, Lowes JA, et al. Presentation, pattern, and natural course of severe symptoms, and role of antibiotics and antibiotic resistance among patients presenting with suspected uncomplicated Urinary tract infection in primary care: observational study. *BMJ*. 2010; 340:5633.
- Suzanne E. Geerlings Urinary tract infections in patients with diabetes mellitus: epidemiology, pathogenesis and treatment *International Journal of Antimicrobial Agents* 31S (2008) S54–S57
- M. Dash, S. Padhi, I. Mohanty, P. Panda, and B. Parida "Antimicrobial resistance in pathogens causing urinary tract infections in a rural community of Odisha, India," *Journal of Family and Community Medicine*, vol. 20, no. 1, pp. 20–26, 2013.
- T. S. Dimitrov, E. E. Udo, F. Awini, M. Emara, and R. Passadilla, "Etiology and antibiotic susceptibility patterns of community-acquired urinary tract infections in a Kuwait Hospital," *Medical Principles and Practice*, vol. 13, no. 6, pp. 334–339, 2004.
- O. Omigie, L. Okoror, P. Umolu, and G. Ikuh, "Increasing resistance to quinolones: a four-year prospective study of urinary tract infection pathogens," *International Journal of General Medicine*, vol. 2, pp. 171–175, 2009.
- Hussein, N.S. 2014. Clinical, etiology and antibiotic susceptibility profiles of community-acquired urinary tract infection in a Baghdad hospital. *Med. Surg. Urol.*, 3(2).
- S.A. Lakshminarayana, Sunil Kumar D Chavan*, R. Prakash and S. Sangeetha Bacterial Pathogens in Urinary Tract Infection and Antibiotic Susceptibility Pattern from a Teaching Hospital, Bengaluru, India *Int.J.Curr.Microbiol.App.Sci* (2015) 4(11): 731-736
- Chaurasia, D., Shrivastava, R., Shrivastava, S., Dubey, D., Songra, M. (2015). Bacterial pathogens and their antimicrobial susceptibility pattern isolated from urinary tract infection in a tertiary care centre.. *International Journal of Pharmacy & Bio-Sciences*, 2(1).1-4