Urinary Tract Infection in Elderly Women Patients Admitted in a Tertiary care hospital - A Case Series Study

Raghavendra Mural [1], Naveena Brid [2], Shashidhar Khanapure [3], Veerabhadrappa kuppast [4], Harshitha S [5], G. Sreenath[6]

[1,2,3] Department of General Medicine, [4] Department of Respiratory Medicine,
S. Nijalingappa Medical College, Bagalkot, Karnataka, India.
[5] Consulting physician at Kauvery Multispecialty hospital Bengaluru, Karnataka, India.
[6]Senior resident, Department of General Medicine, District Hospital, Ballari, Karnataka, India.

Abstract

Background: Urinary tract infection is a common infection among both genders there was higher prevalence among women probably due to the physiology of urinary tract in women. In addition, age is an important factor where elderly people with urinary devices like catheters are prone to the infection.

Aims and Objectives: Study conducted to assess the clinical profile, predisposing factors, uropathogen profile causing Urinary tract infection in elderly women and to identify associated factors responsible for it.

Methods: The study was conducted in, S Nijalingappa Medical College and HSK Hospital, Bagalkot, Karnataka and was conducted in the Department of Internal Medicine. Study period extended from December 2018 to May 2020. It was a study on elderly women patients (age>60 yr) with symptoms of UTI admitted in HSK hospital. Patients were selected based on inclusion and exclusion criteria. Total number of 65 patients were taken for the study.

Results: In our study, UTI commonly witnessed in the age group was 60-69 years. Most common causative organism is E. Coli isolated in 47.7% cases. The average length of hospitalization was 8.65 ± 8.94 days. Most organisms are sensitive to Nitrofurantoin (43%).

Conclusion: 1. Urinary tract infection is common infection among both genders there was higher prevalence among women, age is an important factor where elderly people with urinary devices like catheters are prone to the infection. 2. Diabetes enhances the incidence due to elevated blood sugar levels and has a significant role in the incidence of the infection. 3. As gram negative isolates shows drug resistance, prompt diagnosis and the right choice of antimicrobials can play a key role in reducing mortality in elderly UTI patients.

Keywords: Urinary tract infection, Elderly women, Antibiotic resistance.

Introduction

Urinary Tract Infection (UTI) is a significant cause of morbidity in older gender. Urinary tract infections (UTIs) can occur both in the community and institutional settings[1]. UTI in elderly is marked by absence of fever, change in mental status and nonspecific symptoms such as anorexia and lethargy[2]. Definition of UTI: UTI is broadly defined as an infection of the urinary system, the lower and upper urinary tracts combined. The definition of a symptomatic UTI generally requires the presence of urinary tract-specific symptoms with significant bacteriuria with a quantitative count of ≥105colony forming units of bacteria per milliliter (CFU/ml) in one urine specimen. Asymptomatic bacteriuria in women is defined as presence of at least 105 CFU/mL of the same uropathogen in 2 consecutive clean-catch midstream urine samples obtained from patients without any symptoms or signs attributable to urinary infection[3,4,5].

Urinary tract infections (UTIs) are caused by a wide range of pathogens, including Gram-positive and Gram-negative bacteria, as well as fungi. In patients older than 65, UTIs cause 15.5% of hospitalizations and

6.2% of deaths attributable to an infectious disease[6]. UTIs are the most common type of infection among institutionalized adults and make up over a third of all infections in this population[7-9]. Estimates suggest the overall incidence of UTIs in elderly men and women is in the range of 1 infection per 14 to 20 person-years (0.05-0.07 infections per person-year) [10-11]. UTIs have been well studied in Sweden and other parts of Europe [12]. These studies have shown that 1 in 5 adult women experience a UTI at some point, confirming that it is an exceedingly common worldwide problem. The incidence of UTI in women tends to increase with increasing age[13-15]. Several peaks above baseline correspond with specific events, including an increase in women aged 18-30 years (associated with coitus—so-called honeymoon cystitis—and pregnancy) [16-18]. Infections are high in postmenopausal women because of bladder or uterine prolapse causing incomplete bladder emptying; loss of estrogen with attendant changes in vaginal flora (notably, loss of lactobacilli), which allows periurethral colonization with gram-negative aerobes, such as E coli; and higher likelihood of concomitant medical illness, such as diabetes. UTI results from bacteria entering the urinary tract from the nearby vagina and perineum. Since these areas are normally heavily colonized with bacteria and the urethral opening is located here, the urinary tract is vulnerable to infection. The common pathogens causing UTI are residents of the enteric or vaginal flora. E. coli is by far the most common cause of UTI, causing about 80 % of infections in otherwise healthy womenm[19] and girls[20], followed by Klebsiella, Enterococcus, group B streptococcus, Proteus, and S. Saprophyticus.

Aims and Objectives

Study conducted to assess the clinical profile, predisposing factors, uropathogen profile causing Urinary tract infection in elderly women and to identify associated factors responsible for it.

Materials and Methods

A case series study was conducted in, S. Nijalingappa Medical College and HSK Hospital, Bagalkot, Karnataka, India and was conducted in the Department of Internal Medicine. Study period extended from December 2018 to May 2020. It was a study on elderly women patients (age>60 yr) with symptoms of UTI admitted in HSK hospital. Patients were selected based on inclusion and exclusion criteria.

Total number of 65 patients who visited hospital between December 2018 to May 2020.were considered for the study. Elderly women age >60yrs and with symptoms of Urinary tract infection such as fever with chills, burning micturition, frequency of micturition etc. were included in the study.

Sample size estimation: Sample size estimation was done using open epi software version 2.3.1.

According to the study conducted by Manisha JM, the prevalence of UTI in elderly women is 43%. Taking absolute precision of 12%, sample size estimated is 65.

Sample size $n = [DEFF*Np(1-p)] / [(d2/Z21-a/2*(N-1)+p*(1-p)]$

Methodology: Data was collected using a pretested proforma meeting the objectives of the study. Detailed history detailed examination of all systems with special emphasis on temperature, pulse rate, blood pressure, suprapubic tenderness, costovetebral angle tenderness, tenderness/ mass on deep abdominal palpation were carried out. The purpose of the study will be explained to the patient and informed consent obtained. The diagnosis of UTI was confirmed according to modified Mc Geer criteria. Urine samples will be obtained from all study population preferably early morning clean catch sample.

Urine sample is sent for urine routine and culture/ sensitivity. Routine parameters like complete blood count, renal function test, liver function test was estimated.

Statistical analysis: The collected data were entered in an MS excel sheet. The data were expressed in proportions and percentages in the form of tables and graphs where ever necessary. The clinicomicrobilogical association of UTI in elderly women was analysed using chi-square test. The analysis was done using standard stastistical package. A P-value of <0.05 was taken as statistically significant.

Results

Table 1: Demographic data

Age Distribution in UTI

Age In Yrs	Number of patients	% of patients
60-69	28	43.1
70-79	26	40.0
80-89	11	16.9
Total	65	100.0

In the above table, out of 65 cases, majority i.e., 28 (43.1%) were in the age group of 60-69 years followed by 26 (40%) in the age group of 70-79 years, 11 (16.9%) in the age group of 80-89 years age group

Table 2: Duration of hospital stay due to Urinary tract infection

The above table depict the duration of hospital stay due to UTI. Of the 65 cases, 32 (49.2%)cases had a hospital stay of 2-4 days, 25 (38.5%) cases had a hospital stay of 5-7 days and only 8 (12.3%) cases had a hospital stay of 8-10 days.

Table 3: Presenting symptoms of Urinary Tract infection

Presenting symtoms	No of Cases	Percent
Fever with chills	57	87.7
Burning micturition	57	87.7
Hematuria	17	26.2
Pain abdomen	31	47.7
Back pain	15	23.1
Altered sensorium	14	21.5

In the above table, majority of clinical presentation was fever with chills and burning micturition observed in 57 (87.7%) of cases.

Table 4 : Signs of urinary tract infection

Presenting signs	No of Cases	Percent
Hypogastrium tenderness	36	55.4
Loin tenderness	14	21.5

In the above table and graph, majority of sign elicited is hypogastrium tenderness in 36 (55.4%) cases, followed by loin tenderness elicited in 14 (21.5%) cases.

Table 5 : Association between indwelling catheter and UTI

Indwelling catheter	No of Cases	Percent
Yes	45	69.2
No	20	30.8
Total	65	100.0

In the above table, indwelling catheter was present in 69% cases associated with UTI.

Table 6 : Comorbidities associated with urinary tract infection

Comorbidities	No of Cases	Percent
HTN	23	35.4
DM	39	60.0

In the above table, majority i.e., 39 (60%) cases of UTI were having a history of Diabetes Mellitus and 23 (35.4%) of cases were having a history of Hypertension.

Table 7 : Urine routine findings in urinary tract infection

Urine routine	No of Cases	Percent
2-3 pus cells	9	13.8
2-4 pus cells	2	3.1
3-5 pus cells	5	7.7
4-5 pus cells	7	10.8
6-7 pus cells	2	3.1
7-8 pus cells	5	7.7
8-10 pus cells	13	20.0
Plenty of pus cells	22	33.8
Total	65	100.0

In the table, majority of cases i.e., 22(33.8%) had plenty of pus cells on urine routine examination.

Table 8: Distribution of causative organsisms for urinary tract infection

Distribution of causative organisms	No of Cases	Percent
E.coli	31	47.7
K.pneumonia	11	16.9
P.aeroginosa	11	16.9
Enterococcus	3	4.6
Acinetobacter	2	3.1
S.aureus	1	1.5
Candida	5	7.7
NO GROWTH	9	13.8

In the above table, majority i.e., in 31 (47.7%) cases, E. Coli was the causative organism, followed by K. Pneumonia in 11 (16.9%) cases, P. Aeroginosa in 11 (16.9%) cases, Candida in 5 (7.7%) cases, Enterococcus in 3 (4.6%) cases, Acinetobacter in 2 (1.5%) cases, Staphylococcus Aureus in 1 (1.5%) case. No growth was found in 9 (13.8%) cases.

Table 9: Anti-Microbial Susceptibility in urinary tract infection

Anti microbial susceptibility	Sensitive	Resistant
Amoxclav	6	45
Cefepime	14	37
Ceftazidime	16	35
Cefotaxime	20	31
Nitrofurantoin	41	10
Pipzo	42	9
Imipenem	38	13

In the above table, majority i.e., 43 cases were sensitive to Nitrofurantoin, 42 cases were susceptible to Piperacillin group.

Table 10 : Outcome of admitted cases of urinary tract infection

Outcome	No of Cases	Percent
Improved	47	72.3
Expired	18	27.7
Total	65	100.0

In the above table, majority of cases i.e., 47(72.3%) improved with appropriate treatment, 18(27.7%) cases expired due to complications related to UTI.

Discussion

Most Urinary tract infections are uncomplicated infections. UTIs are considered complicated when patients have functional, metabolic, or structural abnormalities[21,22]. UTI is an important cause of morbidity and sepsis in elderly patients having a spectrum varying from benign cystitis to potentially life-threatening pyelonephritis[23,24]. Epidemiology: In our study, UTI commonly witnessed in the age group was 60-69 years, whereas in the study carried out by Dinesh and his team[25], UTI was more common in females of age group 31-45 years. The difference might be because our study was conducted in geriatric populations whose comorbidities such as diabetes mellitus. In our study population, out of all UTI cases, 60% of cases have a history of diabetes mellitus in the study conducted by Pargavi et al. in diabetic patients showed an incidence of 37% of UTI[26], Marques et al. study[27] showed 23.52% had DM-UTI and in Mahesh et al. study[28] 42.6% of the study population has a history of diabetes mellitus. This shows that diabetes mellitus is one of the major risk factors for the incidence of UTI. Fu et al. study also showed 20.2% elderly DM patients had UTI. Clinical presentation: In present study, lower urinary tract symptoms were more common with burning micturition being the most common symptom followed by urgency, and increased frequency of micturition which may be attributed to a greater number of cases suffering from diabetes mellitus. In study conducted by Mahesh E et al, fever was the most common symptom followed by dysuria[28].

In patients with chronic renal insufficiency, the risk might be increased by disease factors (papillary necrosis, nephrolithiasis, neurogenic bladder) and the management of comorbidities with Foley catheters and intravenous lines[29]. In our study, the average length of hospitalization was 8.65 ± 8.94 days, which is closer to Faryabi et al. (10.72 ± 5.2 days) study[29]. Most of the patients (52.4%) was prescribed with single antibiotic, whereas in a study conducted by Faryabi et al. dual drug (antimicrobial agent) regimens were high (38%) but same for a single drug regimen (31.3%)[29] However, prevalence of dementia and urinary catheterization was higher in study by Tal S et al, which could be attributed to high mean age at presentation[30]. Microbiology: The most common pathogenic organisms observed in our study was gram negative organisms and was similar when compared to the other studies. Gram negative pathogens were responsible for urinary tract infection in our study group in 68.27% of the patients with E. coli being the most common (47.7%) followed by other organisms isolated in urine culture being Klebsiella, Pseudomonas, Proteus, Acinetobacter and Citrobacter group which was in lines with the data available worldwide and confirmed by Faryabi et al.,[29] Arslan et al.,[31] Peterson et al.[32] and Marques et al[27]. studies (75.6% E. coli). Among gram positive organisms which accounts for 28% of isolates, its chiefly constituted Enterococcus sps [8] and Staphylococcus sps (MRSA; 3, Staphylococcus aureus; 2 and MSSA; 1).

Drugs and Interactions: In our study, E. coli was sensitive to nitrofurantoin (43%), piperacillin (42%) followed by Imipenem (38%) which is like the study conducted by Faryabi et al.[29] E. coli is highly resistant to fluoroquinolones (levofloxacin/ciprofloxacin; 100% and norfloxacin; 85%) which area contrast to study conducted by Shalini et al. which showed, levofloxacin (75%), ciprofloxacin (73.9%) and norfloxacin (69.6%) as sensitive. Antibiotic susceptibility pattern of other organisms isolated was not considered as significant in view of less numbers of isolation. In a study by Bagshaw et al, recorded enterococci as the third most frequent uropathogen in intensive care unit-acquired urinary tract infection after E. coli and Pseudomonas aeruginosa[33]. In the last few years, enterococcal infections have become frequent occurrences in hospital settings. Currently they are an important cause of nosocomial infections with increasingly common isolates that are resistant to multiple antibiotics[34,35]. Our antibiotic sensitivity pattern included nitrofurantoin, penicillins, aminoglycosides, cephalosporins and others. In our study, E. coli were highly sensitive to carbepenems like imipenem; and they were least sensitive to cephalosporin group thus showing resistance to higher antibiotics. Study done by Ramaprasad AV et al, in India showed effectiveness of quinolones like ciprofloxacin against E. coli which was in contrast to our study thus pointing towards emergence of drug resistance[36]. Other gram-negative isolate from our study group, Klebsiella, Proteus and Acinetobacter group showed less sensitivity to piperacillin + tazobactum, and other cephalosporins showing shifting trend in resistance to higher antibiotics.

In our study, Candida group contributed (7.7%) for urinary tract infection in elderly. It is increasingly becoming an important subgroup of nosocomial urinary tract infections and almost all are caused by Candida spp[36]. Comorbidities : Diabetes mellitus was the most common underlying disease noted in almost every study of candiduria and predisposes to Candida colonization of the vulvo-vestibular area in women by enhancing urinary fungal growth in the presence of glycosuria, by lowering host resistance to invasion by Candida spp. as a consequence of impaired phagocyte activity, and promoting stasis of urine in a neurogenic bladder with more likelihood to undergo urinary tract instrumentation and to receive antibiotics[36]. Our study had diabetes mellitus, complicated UTI as a risk factor for mortality and were considered statistically important. Complicated UTIs in diabetics include renal and perirenal abscess, emphysematous pyelonephritis, emphysematous cystitis, fungal infections, and papillary necrosis[20]. Early diagnosis, prompt therapy, regular monitoring of blood sugar levels are key factors for improved outcomes in these patients. UTI may cause sepsis or septic shock in elderly patients, so treating physicians should give utmost attention to these patients. There is the risk of developing Acute Kidney injury secondary to Urosepsis and utmost care and management must be given to high-risk patients. Outcome of patients of UTI based on leucocyte counts which is a criterion for sepsis and presence of upper UTI showed no significant difference in our study.

Conclusion

In conclusion, this study focused on epidemiology, risk factors, clinical features and especially on outcome of UTI in elderly patients. Urinary tract infection is a common infection among both genders there was higher prevalence among women probably due to the physiology of urinary tract in women. In addition, age is an important factor where elderly people with urinary devices like catheters are prone to the infection. Patients undergoing long term treatment with antibiotic are also vulnerable to the infection due to moist hospitalized conditions. In addition, diabetes enhances the incidence due to elevated blood sugar levels and other factors like immunosuppressant and geographical location also has a significant role in the incidence of the infection. Though antibiotic usage has proven to be beneficial in counteracting the infection, plant source like cranberry juice is equally effective in fighting the infection and can be used as an alternative to counteract the pathogen causing UTI. Diabetes mellitus continues to be a major risk factor for UTI in elderly. As gram negative isolates shows drug resistance, prompt diagnosis and the right choice of antimicrobials can play a key role in reducing mortality in elderly UTI patients.

References

1. Robichaud S, Blondeau JM. Urinary tract infections in older adults: current issues and new therapeutic options. Geriatrics and Aging. 2008; 11:582-8.

2. Matthews SJ, Lancaster JW. Urinary tract infections in the elderly population. Am J Geriatr Pharmacother. 2011; 9:286-309.

3. Sobel JD, Kaye D. Urinary tract infections. In: Mandell Gl, Bennett JC, Dolin R., editors. Mandell, Douglas, and Bennett's: Principles and Practice of Infectious Disease. 7. Philadelphia, PA: Elsevier; 2010. p. 957.

4. Monane M, Gurwitz JH, Lipsitz LA, Glynn RJ, Choodnovskiy I, Avorn J. Epidemiologic and diagnostic aspects of bacteriuria: a longitudinal study in older women. J Am Geriatr Soc. 1995; 43(6):618-622.

5. Kaye D, Boscia JA, Abrutyn E, Levison ME. Asymptomatic bacteriuria in the elderly. Trans Am Clin Climatol Assoc. 1989; 100:155-162.

6. Nicolle LE. Urinary tract infections in the elderly. Clin Geriatr Med. 2009; 25(3):423-436.

7. Curns AT, Holman RC, Sejvar JJ, Owings MF, Schonberger LB. Infectious disease hospitalizations among older adults in the United States from 1990 through 2002. Arch Intern Med. 2005; 165(21):2514-20.

8. Tsan L, Davis C, Langberg R, et al. Prevalence of nursing home-associated infections in the Department of Veterans Affairs nursing home care units. Am J Infect Control. 2008; 36(3):173-9.

9. Cotter M, Donlon S, Roche F, Byrne H, Fitzpatrick F. Healthcare-associated infection in Irish long-term care facilities: results from the First National Prevalence Study. J Hosp Infect. 2012; 80(3):212-6.

10. Jackson SL, Boyko EJ, Scholes D, Abraham L, Gupta K, Fihn SD. Predictors of urinary tract infection after menopause: a prospective study. Am J Med. 2004; 117(12):903-11.

11. Griebling TL. Urologic diseases in America project: trends in resource use for urinary tract infections in women. J Urol. 2005; 173(4):1281-7.

12. Naber KG; Schito G; Botto H; Palou J; Mazzei T. Surveillance study in Europe and Brazil on clinical aspects and Antimicrobial Resistance Epidemiology in Females with Cystitis (ARESC): implications for empiric therapy. Eur Urol. 2008; 54(5):1164-75.

13. Jackson SL, Boyko EJ, Scholes D, Abraham L, Gupta K, Fihn SD. Predictors of urinary tract infection after menopause: a prospective study. Am J Med. 2004; 117(12):903-911.

14. Foxman B, Barlow R, D'arcy H, Gillespie B, Sobel JD. Urinary tract infection: self-reported incidence and associated costs. Ann Epidemiol. 2000; 10(8):509-515.

15. Eriksson I, Gustafson Y, Fagerstrom L, Olofsson B. Prevalence and factors associated with urinary tract infections (UTIs) in very old women. Arch Gerontol Geriatr. 2010; 50(2):132-135.

16. Donaldson RL, Meana M. Early dyspareunia experience in young women: confusion, consequences, and help-seeking barriers. J Sex Med. 2011; 8:814- 23. 33.

17. Coyne KS, Sexton CC, Thompson C, et al. The impact of OAB on sexual health in men and women: results from EpiLUTS. J Sex Med. 2011; 8:1603- 15.

18. Sacco E, D'Addessi A, Racioppi M, et al. Bladder pain syndrome associated with highest impact on sexual function among women with lower urinary tract symptoms. Int J Gynaecol Obstet. 2012; 117:168-72.

19. Stamm WE. "Scientific and clinical challenges in the management of urinary tract infections." The American journal of medicine 2002. 113 Suppl 1A: 1S-4S

20. Gaspari RJ, Dickson E, Karlowsky J, Doern G. Antibiotic resistance trends in paediatric uropathogens. International Journal of Antimicrobial Agents 2005; 26940: 267-71.

21. Hooton TM. Uncomplicated urinary tract infection. N Engl J Med 2012; 366(11):1028-37. doi:10.1056/NEJMcp1104429.

22. Nicolle LE, Evans G, Laverdieve M, et al. Complicated urinary tract infection in adults. Can J Infect Dis Med Microbiol 2005; 16(6):349-60.

23. Matthews SJ, Lancaster JW. Urinary tract infections in the elderly population. Am J Geriatr Pharmacother 2011; 9:286- 309.

24. Mahesh E, Medha Y, Indumathi VA, Kumar PS, Khan MW, Punith K. Community-acquired urinary tract infection in the elderly. BJMP 2011; 4:a406.

25. Dinesh K. Dhodi, Sarita Jaiswar, Sagar B. Bhagat, Rohini S. Gambre A study to evaluate prescribing pattern of antibiotics among patients of urinary tract infection with preexisting renal disorders in a tertiary care hospital Int J Basic Clin Pharmacol, 2014; 3(4): 687-691.

26. Pargavi B, Mekala T, ThamaraiSelvi A, Moorthy K. Prevalence of urinary tract infection among diabetics patients in Vandavasi, Tamilnadu, India. Int J Biol Technol. 2011; 2:42-5.

27. Marques LP, Flores JT, Barros JOO, Rodrigues GB, Mourão CM, Moreira RM. Epidemiological and clinical aspects of urinary tract infection in community-dwelling elderly women. Braz J Infect Dis. 2012; 16:436-41.

28. Mahesh E, Ramesh D, Indumathi VA, Punith K, Raj K, Anupama HA. Complicated urinary tract infection in a tertiary care center in South India. Al Ameen J Med Sci. 2010; 3:120-7.

29. Faryabi R, Mathew J, Palaye M, Nair S, Shivshankar, Shetty PK, et al. Antibiotic utilization in patients with complicated urinary tract infection in the medicine wards of a South Indian tertiary care teaching hospital. RJPBCS. 2014; 5:87-94.

30. Tal S, Guller V, Levi S, Bardenstein R, Berger D, Gurevich I, et al. Profile and prognosis of febrile elderly patients with bacteremic urinary tract infection. J Infect. 2005; 50(4):296-305. doi:10.1016/j.jinf.2004.04.004.

31. Arslan H, Azap OK, Ergönül O, Timurkaynak F. Urinary tract infection study group. Risk factors for ciprofloxacin resistance among Escherichia coli strains isolated from community-acquired urinary tract infections in Turkey. J Antimicrob Chemother. 2005; 56:914-8. 23.

32. Peterson J, Kaul S, Khashab M, Fisher A, Kahn JB. Identification and pretherapy susceptibility of pathogens in patients with complicated urinary tract infection or acute pyelonephritis enrolled in a clinical study in the United States from November 2004 through April 2006. Clin Ther. 2007; 29:2215-21.

33. Bagshaw S.M., Laupland K.B. Epidemiology of intensive care unit-acquired urinary tract infections. Curr Opin Infect Dis 2006; 19:67-71.

34. Bhat KG, Paul C, Ananthakrishna NC. Drug resistant Enterococci in a south Indian hospital. Trop Doct. 1998; 28:106-7.

35. Facklam RR, Teixeira LM. Enterococcus. In: Lollier L, Balows A, Sussman M, editors. Topley and Wilson's Microbiology and Microbial Infections. 9th ed. New York: Oxford University Press; 1998. pp. 669-82.

36. Ramaprasad AV, Jayaram N, Nageshappa G. Urine Culture Sensitivity Pattern in a Private Laboratory Setup. Indian J Pathol Microbiol 1993; 36:119-23.