



## Original Research Article

## Evaluation of urinary tract infections in geriatric patients attending a tertiary care hospital

Ajay Kumar Pandita<sup>1,\*</sup>, Dimple Raina<sup>2</sup>, Tanya Arora<sup>2</sup>, Puneet Ohri<sup>1</sup><sup>1</sup>Dept. of Community Medicine, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India<sup>2</sup>Dept. of Microbiology, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India

## ARTICLE INFO

## Article history:

Received 26-06-2020

Accepted 13-07-2020

Available online 26-08-2020

## Keywords:

Geriatric

Urinary tract infection

Evaluation

Diabetes mellitus

Mortality

## ABSTRACT

**Introduction:** In geriatric patients, urinary tract infections (UTIs) can pose quite a challenge to the treating clinicians regarding the approach for diagnosis, treatment, and prevention as the patients frequently present with symptoms which may be nonspecific and are associated with comorbid conditions.

**Aims and Objectives:** The study aimed to determine the frequency and specificity of the clinical features of UTI in the geriatric group and their relationship with characteristics that define functional ability in them.

**Materials and Methods:** A total of 380 geriatric patients were recruited for the study. Associated symptoms, isolation of recognized pathogen on culture and evidence of white blood cells in the urine were taken as criteria for diagnosing UTI in these patients.

**Results:** Out of 380 patients recruited in our study 56.31% were males and 43.68% comprised of females. Burning micturition was a predominant symptom in both males (66.8%) and females (72.2%). Most common predisposing factor was diabetes mellitus in 61% of the geriatric population in our study. Escherichia coli was the predominant organism isolated from specimens of 59.73% patients. Mortality rate in our study was 10.26%. There was a significant association (P value <0.001) between diabetes mellitus and the mortality rate. Statistically significant high mortality rate was also seen in patients with chronic kidney disease (P value <0.00001) and with increasing number of predisposing factors (P value <0.00725).

**Conclusion:** Considering the potential for serious complications and mortality in the elderly patients with UTI they should be clinically evaluated systematically specifying a necessity for prompt diagnostic vigilance.

© 2020 Published by Innovative Publication. This is an open access article under the CC BY-NC license (<https://creativecommons.org/licenses/by-nc/4.0/>)

### 1. Introduction

The elderly population suffers from augmented sensitivity to infections because of clinical effects of immune senescence. Urinary tract infections (UTI) have been recognized as the second most common infection in the geriatric population both in the community and institutional settings.<sup>1</sup> In older adult individuals there is a multitude of factors such as malnutrition, co-morbidities particularly diabetes mellitus and social health-related factors which have a bearing on the increased incidence of infections in them.<sup>2</sup> In scenarios of associated chronic diseases there is a high possibility of hospitalization.<sup>3</sup>

Predisposing factors in the elderly could be chronic diseases, urinary retention, neurologic diseases like stroke, benign prostatic hypertrophy (BPH), medications like anticholinergics, antihistamines, psychotropics, and pain medications causing disturbances in bladder motility and urine flow, estrogen deficiency resulting in vaginal atrophy and cystocele.<sup>4</sup> Diagnosis of UTIs in older people presents a practical challenge to the treating clinicians in many cases since the clinical presentations of co-morbidities and the occurrence of diverse disabilities can potentially complicate the assessment of the clinical condition of the older patient and make conclusive opinion of UTI very complex.<sup>2</sup>

More ever, communication with a geriatric patient is sometimes easier said than done due to multifaceted

\* Corresponding author.

E-mail address: [dr.ajaypandita@gmail.com](mailto:dr.ajaypandita@gmail.com) (A. Kumar Pandita).

age-related problems like cognitive deterioration which detract the chances of a reliable clinical examination by the clinician.<sup>2</sup> The range of clinical presentations of UTI in elderly group differ from the classic signs and symptoms and are more or less replaced /coupled with atypical presentations like anorexia, augmented lethargy, delirium and a blunted fever response.<sup>5</sup> Even collection of urine samples sometimes becomes difficult for these patients because of the associated delirium and other illnesses.<sup>2</sup>

Since the clinical picture of UTI in older people is nonspecific and poses a universal problem in everyday clinical practice hence this study was done to accentuate some key aspects about urinary tract infections in the elderly and investigate clinical findings, diagnostic approaches, complicating factors, causative microorganisms and mortality rates in geriatric patients diagnosed with UTI.

## 2. Materials and Methods

This study was conducted at Department of Community Medicine in co-ordination with Department of Microbiology, Shri Guru Ram Rai Institute of Medical & health Sciences and associated Shri Mahant Indresh hospital. This was a prospective hospital-based study done in the department of Community Medicine with co-ordination from Department of Microbiology and was conducted over a period of one year from 1<sup>st</sup> May 2019 to 1<sup>st</sup> May 2020. This study was approved by the Institutional research and ethical committee and written informed consent was taken from participants 60 and above years of age who were included in the study.

A total of 2060 geriatric patients complaining of UTI like symptoms and either admitted in the hospital or having visited outpatient departments of the hospital were evaluated during the course of the study. Only one sample from each patient was considered. However, 380 patients  $\geq 60$  years exhibiting both signs and symptoms of UTI and positive urine cultures were encompassed in the study. Patients with negative urine culture, patients on prophylactic antibiotics, with severe medical disability, patients suffering from medical conditions that could daunt the ability to suitably collect urine; such as stroke, dementia or other serious psychiatric conditions were excluded from the study.

A detailed account was taken of the demographic data, predisposing factors, additional diseases, underlying urological pathologies, recurrent UTIs, hospital admissions, durations of hospitalization, presence of urinary catheter and duration of catheterization. Clinical profile was assessed by taking a comprehensive history of symptoms like dysuria, fever with chills, urgency, frequency, backache, pain in abdomen, flank tenderness / vague abdominal tenderness, decreased frequency of micturition, burning micturition, hematuria and pyuria.

The first midstream clean-catch urine specimens were sent to the microbiology laboratory for urine microscopy, growth analysis and culture sensitivity. The constellation of associated symptoms confined to the urinary tract or external to it; identification of a recognized pathogen on culture; bacteriuria (more than  $10^5$  colony forming units (CFU)/mL; without catheter) and ( $10^2$  colony forming units (CFU)/mL from catheterized specimens); and evidence of white blood cells in the urine ( $\geq 10$  WBCs per HPF) were all taken as criteria for diagnosing the patient as suffering from UTI.

Data were analysed using Microsoft excel. Descriptive statistical analyses and descriptive values of obtained data were presented as numbers with percentage frequencies. t-test and chi-square test were used to compare independent variables with  $P < 0.05$  considered as statistically significant.

## 3. Results

The study population comprised of geriatric patients  $\geq 60$  years. A total of 380 patients were diagnosed as having UTI as per the inclusion criteria laid down for the study. Majority of the patients (56.31%) comprised the 60-70 age group followed by 35% in the 71-80 age group. 8.67% patients were however  $> 80$  years. 214 (56.31%) were males in the study population while 166 (43.68%) encompassed females (Figure 1). The male to female ratios in the 60-70, 71-80, 81-90 and 91-100 age groups were 1:1.05, 1.9:1, 2.1:1 and 1:1 respectively. 66.26% females were diagnosed for UTI as compared to 48.59% in males, in the 60-70 age group. However, the male ratios were higher for the other age groups as compared to females ( $P$  value 0.00703) (Table 1). 123 (32.36%) patients in our study were from outpatient department (OPD) while 257 (67.63%) patients were indoor patients (IPD) largely admitted in medicine (49.4%), surgery wards (33.8%), Gynaecology/obstetrics (10.2%) and various ICUs (6.6%).

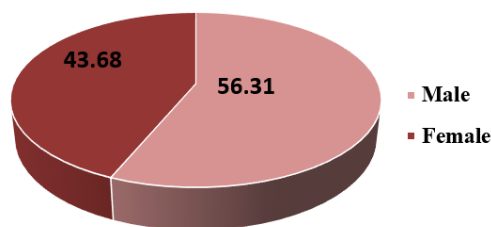
Burning micturition was seen as a common predominant symptom in both males (66.8%) and females (72.2%). In males the other predominant symptoms were urgency (60.2%), fever (51.8%) and dysuria (49.5%). In females; dysuria (68.7%), urgency (65.6%) and vaginal irritation (43.9%) were the other predominant symptoms (Figure 2).

Amongst the predisposing factors in the elderly population diabetes mellitus was predominant in 61% of the geriatric population followed by 41.5% of patients on catheters whereas 38.6% patients had chronic kidney disease. Benign prostatic hypertrophy was seen as an influencing attribute in 10% of males (Figure 3).

Urine culture analysis in the geriatric patients showed the predominant growth of gram-negative organisms. Escherichia coli was the predominant organism isolated from specimens of 227 (59.73%) patients followed by Klebsiella pneumoniae and Pseudomonas aeruginosa; isolated from 59 (15.52%) and 51 (13.42%) patients

respectively (Table 2).

Mortality was reported in 39 (10.26%) patients and 341 (89.73%) patients from the study population were discharged/recovered. All these 10.26% patients were hospitalized and no death was reported in OPD patients. No significant variance was observed in mortality rates of males and females and also between different age groups. There was a statistical association (P value <0.001) between mortality rates in the diabetic patients (14.22%) and in the nondiabetic patients (4.05%). Presence of chronic kidney disease was also associated with a higher mortality rate (23.80%) and P value (<0.00001) was found to be statistically significant. No significant association was seen between the rates of mortality and patients on catheters wherein mortality rate of 30.76% was seen in catheterized patients in comparison to mortality rate of 69.23% in non-catheterized patients. The number of predisposing factors were also seen to have a statistical association with the mortality rates of geriatric patients (P value 0.0072). Patients with 2-3 predisposing attributes had the maximum mortality rate of 53.84% and a significant statistical association ((P value 0.00725) was seen between the predisposing factors and the mortality rate (Table 3).



**Fig. 1:** Gender wise distribution of geriatric patients (N=380) (%)

#### 4. Discussion

In the geriatric age groups UTI can have manifold manifestations and an array of symptoms from benign urethritis/cystitis to potentially aggressive pyelonephritis. The patients included in this study had a mean age of 66 years (61-94). UTI was predominantly seen in the 60-70 age group both in males and females (56.31%). Similar findings have also been reported by Gaurav K et al. in a study from Lucknow (75.4%).<sup>6</sup> In fact, the incidence of UTI is augmented with older age because of multimorbidity and increased prevalence of supposed geriatric syndromes such as incontinence, dementia, malnutrition, falls, and depression.<sup>7</sup> Cognitive impairment/dementia, diabetes, prostatic hypertrophy in men, urinary incontinence, lowered urination frequencies and decreased fluid intake also add to the risk in elderly.<sup>8</sup>

A significant association (P value 0.00703) was seen between the males (56.31%) and the female geriatric patients (43.68%) diagnosed with UTI; males being afflicted

more than females. This is in concurrence with the studies conducted by Faryabi et al., Mahesh et al. and Prakasam et al. with a male affliction rate of 85.7%.<sup>9-11</sup> However, in a study conducted by Prakash and Saxena UTI was reported to be more common in females (73.57%) rather than males (35.14%).<sup>12</sup> One of the reasons for male preponderance could be that the current study was conducted in a geriatric population majority of whom had co morbidities like diabetes mellitus, chronic kidney disease and age-related prostate hypertrophy which contributed to amplified figures in males. Hospitalized patients comprised 67.63% of the total geriatric patients in our study similar to a study by Swamy S et al. wherein 79.16% patients were hospitalized.<sup>13</sup> As a matter of fact, in elderly patients the associated co-morbidities can mask and further deteriorate the clinical presentations which may require immediate hospitalization.

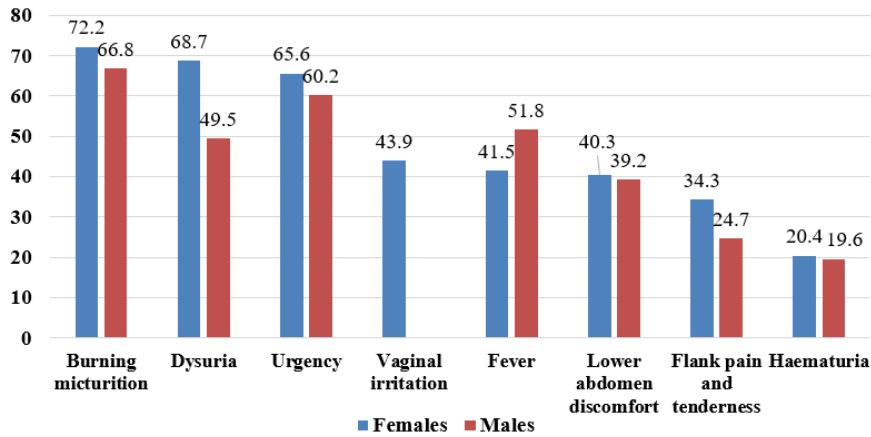
In present study, lower urinary tract symptoms were more common with burning micturition being the most common symptom (66.8%) followed by urgency (60.2%) in males and dysuria (68.7%) in females. Vaginal irritation was also reported in 43.9% female patients which could be due to hormonal imbalances in these age groups causing vaginal atrophy and a raised vaginal pH. In a study by Swamy S et al. burning micturition and urgency were seen in 77.5% and 65.8% cases respectively.<sup>13</sup> The predominance of these symptoms could be because of a majority of cases (61%) suffering from diabetes mellitus, benign prostate hypertrophy (10%) and vaginitis (43.9%) in our study population. However, in a study by Mahesh E et al. fever (29.4%) was reported to be the common symptom followed by dysuria (26.8%).<sup>14</sup> Fever was seen in 51.8% males and 41.5% females in our study cases. This can be attributed to the fact that elderly population also have a physiological lesser basal body temperature hence a blunted fever response could be seen.<sup>15</sup>

In the current study, 61% of UTI patients had a history of diabetes mellitus. High incidence of a previous diabetic history has also been reported in a study by Gaurav K et al. (64.1%).<sup>6</sup> Other studies by Pargavi et al., Marques et al. and Mahesh E et al have revealed an incidence of 37%, 23.52%, and 42.6% of UTI in diabetic patients respectively.<sup>10,16,17</sup> These results show that diabetes mellitus constitutes one of the foremost risk factors for the occurrence of UTI.<sup>18</sup> Prolonged history of diabetes and its increased severity significantly increases chances of occurrence of UTI by causing dysfunctions at the cellular level.<sup>19</sup> Even in patients having chronic kidney disease the risk is increased manifold due to insertion of foley catheters and intravenous lines.<sup>20</sup>

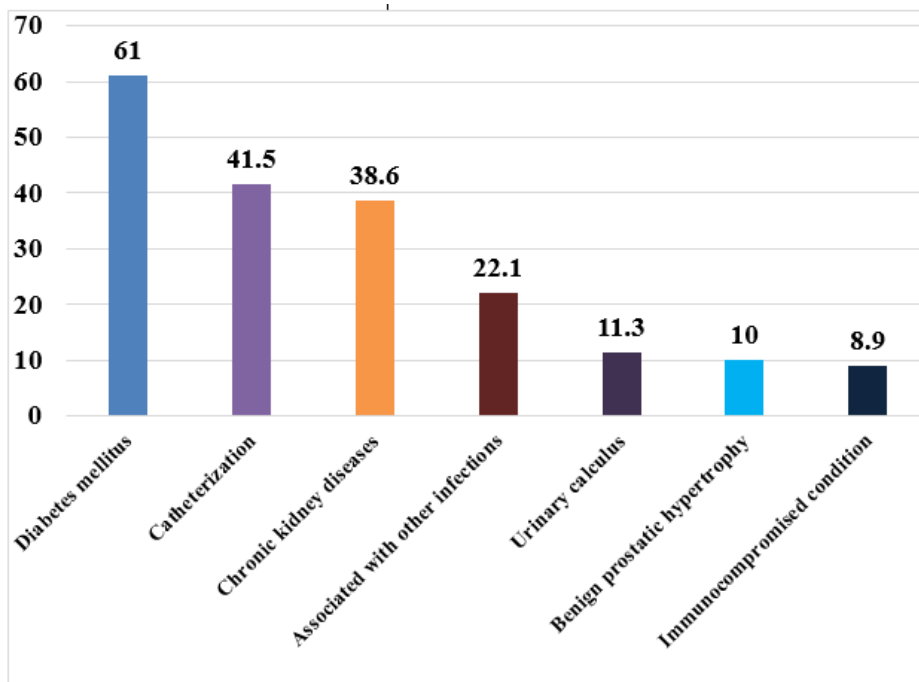
Escherichia coli constituted 59.73% of the study isolates followed by Klebsiella pneumonia (15.52%) in our study. Studies by Arslan et al. and Peterson et al. have reported gram negative organisms such as Escherichia coli (24; 48%) to be the frequent cause of UTI.<sup>21,22</sup>

**Table 1:** Distribution of geriatric patients age-wise (N=380) (%)

Age group	Male		Female		Total No.	% age	P-value
	Number	Percentage	Number	Percentage			
60-70	104	48.59%	110	66.26%	214	56.31%	0.00703 Significant
71-80	88	41.12%	45	27.10%	133	35%	
81-90	21	9.81%	10	6.02%	31	8.15%	
91-100	1	0.46%	1	0.60%	2	0.54%	
Total	214	100%	166	100%	380	100%	



**Fig. 2:** Clinical manifestations in geriatric Patients N=380 (%)



**Fig. 3:** Predisposing factors in geriatric patients (N=380) (%)

**Table 2:** Organisms isolated from urine specimens of geriatric patients (N=380)

Organisms	Frequency	Percentage
Escherichia coli	227	59.73%
Klebsiella pneumoniae	59	15.52%
Pseudomonas aeruginosa	51	13.42%
Proteus mirabilis	11	2.89%
Acinetobacterbaumannii	10	2.63%
Enterobacter aerogenes	7	1.84%
Providencia spp.	6	1.57%
Sphingomonas spp.	3	0.78%
Citrobacter koseri	3	0.78%
Aeromonas spp.	2	0.52%
Acinetobacter lowfii	1	0.26%

**Table 3:** Outcome of UTI in geriatric patients

Characteristic	Number of Deaths/ Number of patients	Mortality (%)	Statistical significance P-value
<b>Diabetes mellitus</b>			
Present	33/232	14.22%	<0.001 Significant
Absent	6/148	4.05%	
<b>Chronic Kidney disease</b>			
Present	35/147	23.80%	<0.00001 Significant
Absent	4/233	1.71%	
<b>Catheterization</b>			
Present	12/39	30.76%	0.19013 Not significant
Absent	27/39	69.23%	
<b>No. of predisposing factors</b>			
0-1	10/39	25.64%	0.00725 Significant
2-3	21/39	53.84%	
3+	8/39	20.51%	

In the current study the outcome was reported by either the death or the discharge/recovery of the patient. A low mortality rate of 10.26% was observed whereas 89.73% patients were discharged/recovered. Low mortality rates have also been reported by Swamy S et al. (29.16%) and Alpay Y et al. (5%).<sup>1,13</sup> Diagnosis in the initial stages only, timely treatment, standard monitoring of blood sugar levels at regular intervals and intensive management of predisposing factors played a key role for better outcomes in these patients. Diabetes mellitus, Chronic kidney disease were major risk factors for mortality and were found to be statistically significant. Even presence of  $\geq 1$  predisposing factor had a significant association with the mortality rate. These findings are in concurrence with a study from Bengaluru by Swamy S wherein Diabetes mellitus and presence of predisposing factors had a significant association with the mortality rate.<sup>13</sup>

## 5. Conclusion

In conclusion, this study focused on epidemiology, predisposing factors, clinical presentations and principally on outcome of UTI in the geriatric patients. Diabetes mellitus, chronic kidney disease persist to be key risk

attributes for UTI in elderly. Also, typical presentations are not readily seen in the elderly and are sometimes masked by other symptoms such as lower abdominal pain, dull fever response, disorientation etc. Comorbidities can affect the setting and seriousness of the infection; this must be considered in the diagnosis and treatment of UTI in an individual patient. Since UTIs are reported through diverse geriatric populations with diverse presentations from the walking well to the chronically sick; stringent regulation and monitoring of the chronic disease conditions and clinching diagnosis in the initial stages with apt antimicrobial therapy can go a long way in avoiding occurrence and recurrence of UTIs in geriatric patients.

## 6. Source of Funding

No funding sources.

## 7. Conflict of Interest

None declared.

## 8. Ethical Approval

The study was approved by the Institutional Ethics and research Committee.

## References

- Alpay Y, Aykin N, Korkmaz P, Gulduren HM, Caglan FC. Urinary tract infections in the geriatric patients. *Pak J Med Sci*. 2018;34(1):67–72.
- Wojszel ZB, Toczyńska-Silkiewicz M. Urinary tract infections in a geriatric sub-acute ward-health correlates and atypical presentations. *Eur Geriatr Med*. 2018;9(5):659–67.
- Borowczyk M, Chmielarz-Czarnocińska A, Faner P, Paciorkowski A, Nowak JK, Szczepanek-Parulska E, et al. Urinary tract infections in postmenopausal women with type 2 diabetes: clinical correlates and quinolone susceptibility. *Pol Arch Intern Med*. 2017;127:305–7.
- Cohen KR, Frank J, Israel I. UTIs in the Geriatric Population: Challenges for Clinicians. *US Pharm*. 2011;36(6):46–54.
- Matthews SJ, Lancaster JW. Urinary Tract Infections in the Elderly Population. *Am J Geriatr Pharmacother*. 2011;9(5):286–309.
- Gaurav K, Mohan TS, Neeti M, Siddique ME. Prevalence of Urinary Tract Infections in Elderly Patients Attending A Tertiary Care Hospital. *Int J Contemp Med Res*. 2019;6(2):13–6.
- Panaszek B, Machaj Z, Bogacka E, Lindner K. Chronic disease in the elderly: a vital rationale for the revival of internal medicine. *Pol Arch Intern Med*. 2009;119(4):248–54.
- Rowe TA, Juthani-Mehta M. Urinary tract infection in older adults. *Aging Health*. 2013;9(5):519–28.
- Faryabi R, Mathew J, Palaye M, Nair S, Shivshankar, Shetty PK. 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.
- 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.
- Prakasam A, Dileesh K, Vijayan M. A cross sectional study on distribution of urinary tract infection and their antibiotic utilization pattern in Kerala. *Int J Pharm Tech Res*. 2012;4:1310–6.
- Prakash D, Saxena RS. Distribution and Antimicrobial Susceptibility Pattern of Bacterial Pathogens Causing Urinary Tract Infection in Urban Community of Meerut City, India. *ISRN Microbiol*. 2013;doi:10.1155/2013/749629.
- Swamy S, Ramaswamy M, Pakale AM. Urinary tract infection in elderly: clinical profile and outcome study done at Kempegowda Institute of Medical Science and Hospital, Bengaluru, India. *Int J Res Med Sci*. 2018;7(1):226–30.
- Mahesh E, Medha Y, Indumathi VA, Kumar PS, Khan MW, Punith K. Community acquired urinary tract infection in the elderly. *Br J Med Pract*. 2011;4(1):406.
- Norman DC. Fever in the Elderly. *Clin Infect Dis*. 2000;31(1):148–51.
- 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;2:42–7.
- Marques LPJ, Flores JT, de Oliveira Barros Junior O, Rodrigues GB, de Medeiros Mourão C, Moreira RMP. Epidemiological and clinical aspects of urinary tract infection in community-dwelling elderly women. *Braz J Infect Dis*. 2012;16(5):436–41.
- Fu AZ, Iglay K, Qiu Y, Engel S, Shankar R, Brodovitz K. Risk characterization for urinary tract infections in subjects with newly diagnosed type 2 diabetes. *J Diabetes Complicat*. 2014;28(6):805–10.
- Chen SL, Jackson SL, Boyko EJ. Diabetes Mellitus and Urinary Tract Infection: Epidemiology, Pathogenesis and Proposed Studies in Animal Models. *J Urol*. 2009;182(6S):51–6.
- Gilbert DN. Urinary Tract Infections in Patients with Chronic Renal Insufficiency: Table 1. *Clin J Am Soci Nephrol*. 2006;1(2):327–31.
- Arslan H, Azap ÖK, Ergönül Ö, Timurkaynak F. Risk factors for ciprofloxacin resistance among Escherichia coli strains isolated from community-acquired urinary tract infections in Turkey. *J Antimicrob Chemother*. 2005;56(5):914–8.
- 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. *Clin Ther*. 2004;29:2215–21.

## Author biography

**Ajay Kumar Pandita** Associate Professor

**Dimple Raina** Associate Professor

**Tanya Arora** Post Graduate Student

**Puneet Ohri** Professor and HOD

**Cite this article:** Kumar Pandita A, Raina D, Arora T, Ohri P. Evaluation of urinary tract infections in geriatric patients attending a tertiary care hospital. *Panacea J Med Sci* 2020;10(2):90-95.