Clinico-Microbiological Profile of Community Acquired Urinary Tract Infection in The Elderly: A Hospital Based Study.

Pradip Kumar Behera[1], Ranjita Panigrahi[2], Surya Narayan Mishra[3], Krishna Padarabinda Tripathy[4]

Associate Prof., Dept. Of Medicine, Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, India
Associate Prof., Dept. Of Pathology, Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, India
Asst. Prof., Dept. Of Microbiology, Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, India
Prof., Dept. Of Medicine, Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, India

Abstract:
Background: Urinary tract infection (UTI) is a serious problem in the geriatric age group. The knowledge of the clinico-microbiological profile and the antibiotic sensitivity pattern is essential for effective management of the problem.
Aim: To find the epidemiological data, common presenting symptomatology, risk factors associated with UTI ,distribution of uropathogens isolated and their sensitivity pattern.
Methodology: An observational prospective study done in a tertiary care teaching hospital in Bhubaneswar, India. Elderly patients aged 60 years and above admitted to the hospital in whom UTI was confirmed with culture positivity were included in the study.
Results: The total number of subjects was 61 with age range of 60-85 yrs and M:F of 1.65:1 . Diabetes (68.8%), HTN (50.8%), BEP (60.5%), UV prolapsed (47.82%), Immobility (13.1%) and malignancy (3.2%) were common co-morbidities observed. Fever(83.6%), Dysuria(62.2%), Increased frequency of urination (68.85%), Hematuria (18.03%), Low abdominal discomfort (30.06%), Acute urinary retention (24.59%) and Urinary incontinence(22.95%) were common symptomatology observed.E coli(52.4%), Klebsiella pneumonie (18.03%) and Enterococoous (14.75%) were common organisms isolated.Colistin, Tigecyclin, Imipenem Teicoplanin Amikacin were common antibiotics to which the common isolates were sensitive. Average duration of hospital stay was 10.53 days. and the death rate was 3.2%.
Conclusion: Early recognition of UTI taking into account the symptomatology and the risk factors, is of paramount importance while treating UTI in geriatric age group. The microbiologic profile and the antibiotic sensitivity pattern will be helpful while initiating empiric treatment. More similar studies from other part of the country will be helpfull in managing geriatric urinary tract infections.

I. Introduction

With aging of nations, the magnitude of geriatric population in every country is increasing. In the year 2002, there were an estimated 605 million old persons in the world out of which 400 million were in the low income countries. By 2025, the number of elderly people is expected to rise more than 1.2 billion with about 840 million of these, in low income countries[1]. Urinary tract infection(UTI) is one of the most prevailing infectious disease (shared by bacteria) among the geriatric population in both genders.[2] Anatomical urinary tract abnormalities, Impaired local protective mechanisms, deteriorating immune status, cognitive impairment , co-morbid conditions such as diabetes, malignancy, steroid use and chronic debility all predispose to urinary tract infections in the elderly. In the frail elderly, with age-associated multiple severe underlying disorders, cognitive impairment early recognition of bacteraemic UTI and prompt treatment are critical in reducing the mortality.[3] The diagnosis and treatment of UTI in geriatric age group requires fair understanding of the atypical presentations of infections in older individuals, the prevalent microbiological epidemiology and their antibiotic sensitivity pattern. The emergence of antibiotic resistance in the management of UTIs is a serious health problem, particularly in the developing world where apart from high level of poverty, ignorance and poor hygienic practices, there is also high prevalence of fake and spurious drugs of questionable quality in circulation.[4] But still there are not much information regarding the microbiological profile, their clinical behaviour and antibiotic sensitivity of uropathogens involved in elderly urinary tract infections in India. So the present study was done to find out patient related information, microbiologic data, clinical behaviour and antibiotic profile of community acquired UTI in elderly hospitalised patients.

II. Methodology

This prospective observational study was carried out in the Dept Of Medicine, Kalinga Institute of Medical sciences(KIMS) ,Bhubaneswar, India over a period of 1 year during the period from April 2015 to

March, 2016 after due approval of the Institutional ethics committee. A total of 240 patients (98 patients>60 years) admitted to Dept of Medicine with clinical diagnosis of UTI or asymptomatic patients with significant number of pus cells in urine or nitrite positivity were enrolled in the study. Patients with history of antibiotic use in preceding 15 days, Hospitalization in last 3 days or patients developing symptoms after 48 hr of hospitalization or history of any kind of urosurgery in last 30 days were excluded from the study. Clinical history and other relevant data were collected in the case report form. Every enrolled patient or their close relatives when required were educated regarding collection of mid stream urine sample and was provided with a sterile container with screw-cap. Clean catch mid-stream urine samples were collected in the sterile containers and were sent within 2 hours to the central laboratory. A preliminary screening of the uncentrifuged urine was done by making a wet-mount and gram stain to observe the polymorphs and the probable pathogen. The samples were then plated as per standard guideline on CLED and Mac Conkey Agar plates and were incubated at 37^0C overnight. The colony growth was observed and the CFU/Ml was noted and are processed to identify the organism both manually and using automated method (BactT alert and Vitek2). The manual sensitivity was also put using the Kirby Bauer's multiple disc diffusion method following standard precaution .Antibiotics commonly used in clinical practice for treatment of urinary tract infection were chosen for sensitivity test. Care was taken to include antibiotics which will cover both gram positive as well as Gram negative organisms. Broad spectrum antibiotics frequently used in empiric therapy of severe infections in ICU set ups were given special importance. After getting all the reports statistical analysis was done.

III. Results

After exercising the inclusion and exclusion criteria, 240 patients were selected for urine culture and sensitivity study out of which 98 patients were >60 years and of these 98 urine samples 61 samples showed significant growth of single micro-organisms with a culture positivity rate of 62.2% and were considered for the final study. In contrast the culture positivity in adults <60 yrs was 44.3%. The male to female ratio in the study group (n=61) was 1.65:1.In contrast the male to female ratio of 1:2.7 among patients <60 years was observed. Table .1 shows the distribution of the study group according to the age and sex.

Table-1(n=61)

Age in years	Male	Female	Total
60-69	18	10	28
70-79	12	08	20
≥80	O8	05	13
Total	38	23	61

Majority of the patients were in the age range of 60-69 years (45.9%) followed by 70-79 years (32.7%). Male subjects were more than the female in all age groups.
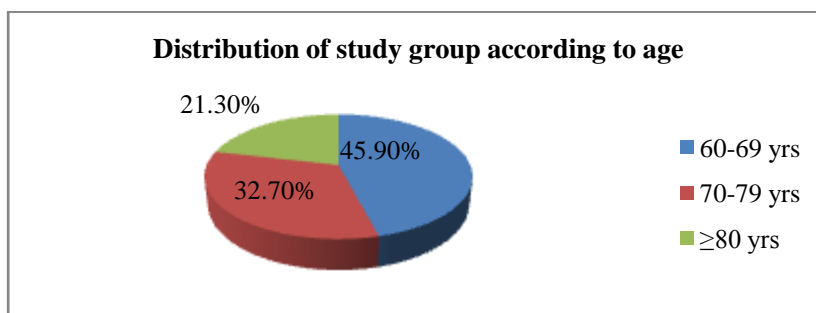

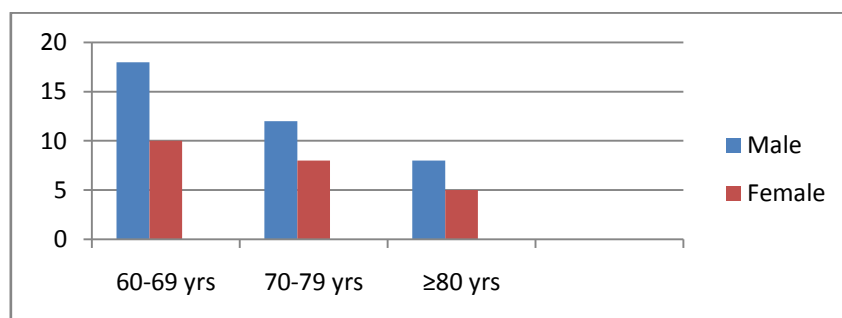**Fig 1:** Distribution of the study groups according to age.

Fig. 2 Age and sex distribution of study group

Multiple co-morbidities were observed among the subjects. The most common risk factor noted was diabetes mellitus.(68.8%). 50.8% subjects had hypertension and 37.7% of the patients were both diabetic and hypertensive. Among the male subjects, 23 patients(60.5%) had symptomatic Benign enlargement of prostate(both newly diagnosed as well as known cases under treatment).47.82% of female patients had utero-vaginal prolapse of varying degree.3 patients (4.9%) had renal/ureteric stone. There was history of recurrent UTI in 26.2% of subjects and diagnosed malignancy in 3.2% cases (2 cases of Ca prostate). 13.1% of cases were bed ridden or wheel chair bound.
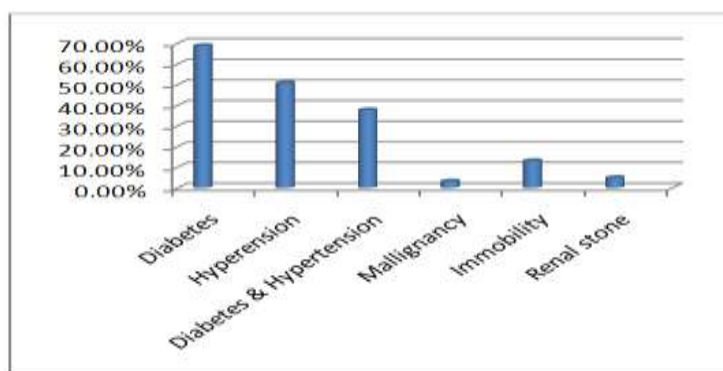

Fig.3 Co-morbidities associated with UTI in elderly.

At initial presentation, fever was the most common symptom accounting for 83.6%. Dysuria , increased frequency of urination and hematuria was the complaint in 68.85% , 62.2% and 18.03% of subjects respectively. Low abdominal discomfort, Acute urinary retention and urinary incontinence were reported in 36.06%, 24.59% and 22.95% of cases.
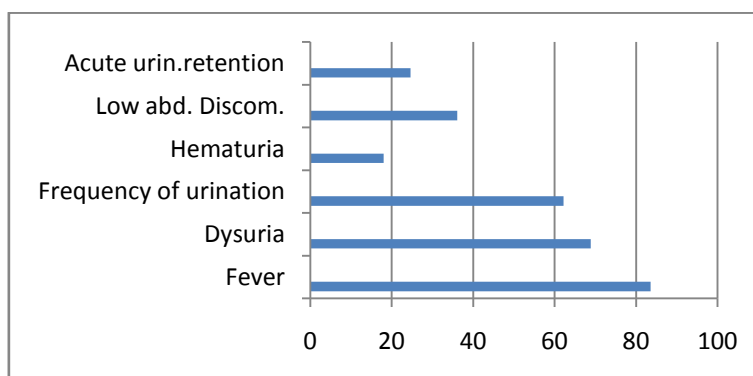

Fig.4 Frequency of various Symptoms at initial presentation.

E. coli was the most common uropathogen isolated accounting for 52.4% cases followed by Klebsiella , Enterococous and pseudomonas which were isolated at a frequency of 18.03%, 14.75% and 3.27% respectively .Staph. aureus and Candida species Were isolated at a frequency of 3.27% each.
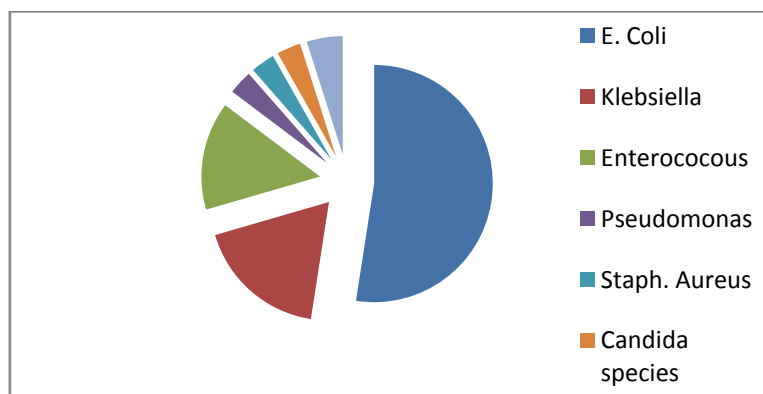

Fig. 5. Distribution of Organisms isolated in the study

Table 2. Showing Antibiotic sensitivity and resistance pattern against three most common uropathogens isolated.

Organisms isolated	Antibiotics sensitivty	Antibiotic resistance
E. coli	Colistin-90% Amikacin -80 % Nitrofurantoin-80%	Ampicillin-88% Cefuroxime-84% Ciprofloxacin-88%
K. pneumonie	Tigecycline-84% Colistin-80% Imipenem-60%	Ampicillin-100% Cefuroxime-96% Ceftriaxone-80%
Entero. fecalis	Teicoplanin-98% Tigecycline-94% Vancomycine-92%	Ciprofloxacin-100% Levofloxacin-86% Tetracycline-84%

The most common isolate E. Coli showed 90% sensitivity to colistin. Other antibiotics which were also highly effective against E.Coli were Amikacin 80%,Imipemem- 76% and Nitrofurantoin-80%.Antibiotics to which E. Coli showed high resistance were Ampicillin(88%), Cefuroxime(84%) and Ciprofloxacin (88%). Antibiotics like Tigecycline, Colistin and Imipenem showed high sensitivity against K. Pneumonie with sensitivity rate of 84%, 80% and 60% respectively.K. Pneumonie was highly resistant against Ampicillin(100%), Cefuroxime(96%) and ceftriaxone (8o%).Teicoplanin(98%), Tigecycline(94%) and Vancomycine (92%) were highly effective against Enterococous fecalis. The same organism showed high resistance against quinolons like ciprofloxacin(100%), Levofloxacin.(86%)and Tetracycline(84%).Average period of hospitalisation was 10.53 days(ranging from 8 to 19days.)12 patients required shifting into ICU out of which there were 2 deaths(3.2%) .43 patients were hemodynamically stable, 10 patients had sepsis without MODS and 8 patients had sepsis with MODS. Sepsis was more common in elderly age group more than 75 yrs.

IV. Discussion

Urinary tract infection are one of the most common infections in geriatric population. If chronic diseases like diabetes or hypertension are concomitantly present, the chances of UTI are higher and can even sometimes lead to mortality. Diagnosis and treatment of UTI in elderly varies when compared to younger patients and is quiet difficult due to the non specific or absence of symptoms and lack of clear clinical history.[5]

Except among infants and elderly, UTI occurs far more commonly in females than males.[6] In our study comprising the elderly population, we observed the male to female ratio of 1.65:1. Similar observations were also reported in other similar studies by Mahesh E. et al [7](Male:Female=1.48:1), Arul Prakasham et al[8] ,Venkatesh et al[9] (Male: Female=1.12:1) and Faraby et al[10] (Male:Female=1.18:1). All these study including ours proved that in geriatric population male gender are more susceptible for UTI than females. The higher incidence of UTI in elderly male as compared to younger male may be due to presence of urinary tract obstruction secondary to prostatic hypertrophy.

Diabetes mellitus was the most common co-morbidity in our study. 68.8% subjects in our study were diabetics. Similar results were observed by Mahesh et al [7](50%), Venkatesh et al [9](64.1%) and Marques et al [11](23.52%).From all these studies it can be concluded that diabetes is a strong risk factor for UTI particularly at elderly age group. This may be due to the fact that diabetes mellitus has a number of long term effects on the genitourinary system. Diabetic nephropathy, reduced immunity and neurogenic bladder with reduced detruser activity all may contribute to increased susceptibility to UTI in dibetes. Reccurent UTI and immobility were found to be associated in 26.2% and 13% of cases in our study and may also be considered as strong risk factors for UTI in the elderly .

In our study fever was the most frequent symptom observed in 83.6% of patients at initial presentation. Similar observation reported by various researchers world-wide.[7,12-14] Studies have found that the elderly do not lack a febrile response ; that an elevated temperature was the most common initial symptom , a marker for serious infection and the most important clinical indicator for antibiotic treatment.[15] Dysuria(68.85%), increased frequency of urination(62.2%) and lower abdominal discomfort(36.06%) were the presenting complaint more frequently than hematuria(18.03%), acute retention(24.59%) or incontinence(22.95%). From the above observation we can conclude that presence two or more of the above symptoms in association with a risk factor, the probability of UTI is very high and empiric antibiotics should be initiated without delay while awaiting for culture sensitivity report as a delay in interpreting fever as a symptom of UTI can led to a high mortality in the elderly within 24 hr of admission.(Whitelaw et al).[16]

In our study, E.coli (52.4%), Klebsiella (18.3%) and Enterococous(14.7%) were the three most common isolates .Similar microbiological profile was observed in the study by Venkatesh et al[7] and Mahesh et al[9] where E. Coli was the isolate in 48% and 71.1% of cases respectively. E.coli was also the most common isolate in many other similar studies worldwide. [17-18] The microbiological profile of the UTI in elderly did not

vary widely when compared with the adult population as a whole, as observed by the same author in an earlier study.[19] It was also observed that diabetes did not influence the microbiological profile as was observed by Mahesh et al[9] and Bonadio et al.[20]

In our study E. Coli was very much sensitive to antibiotics like Colistin(94%), Amikacin(84%), Nitrofurantoin(72%) and Imipenem(72%). Venkaesh et al in their study also observed that E. Coli was completely sensitive to Amikacin and Imipenem. Ampicillin, Amoxycilin, Ciprofloxacin and Cefuroxime were much inefective against E.coli with high resistance (88%, 72%, 88% and 88% respectively). Klebsiella pneumonie showed high sensitivity towards Tigecycline(84%) , colistin(80%) and Imipenem(60%) whereas Ampicilin(100%) Cefuroxime(96%) and ceftriaxone(80%) were very much ineffective against it. Similar observations were observed by Shalini et al[21] in their study. Enterococci accounted for 14.75% of all isolates and antibiotics like Teicoplanin(98%) , Tigecycline(94%) and Vancomycin (92%) were very much effective against it whereas quinolones were ineffective with high resistance pattern. Similar observation reported by Alka Nerurkar et al[22] in their study. Average duration of hospitalisation was 10.53 days and 3.21% of patients died. Similar results were noted in the study by Venkatesh et al.[9]

V. Conclusion

Urinary tract infection is one of the common infections in the geriatric age group requiring hospitalisation. The presence of multiple co-morbidities, anatomical and physiological changes in the genitourinary tract with ageing, declining immune status all increase the susceptibility for UTI in the elderly. Increased incidence of antibiotic resistance in general population at present time makes the situation worse with increased morbidity and mortality and increased cost of therapy particularly in a country like India. Changing social structure with less attention for elderly, lack of social and financial security, low level of awareness regarding health insurance all add to the difficulties associated with geriatric care in our country. Early recognition of UTI, prompt initiation of treatment with appropriate antibiotics will improve outcome and care must have to be taken to avoid antibiotic resistance. More studies are required in the field of geriatric health to explore the difficulties and find out the solutions to reduce the geriatric morbidity and mortality.

References

[1]. Health action(2004), Eldercare,Feb. 2004, Vol-17, No.2.
[2]. Lim VH, Whitehurst T, Usoro E, Ng SM. Management of urinary tract infections in elderly patients: Strategies for improvement.BMJ Qual improve. Report. 2014;3:doi:10.1136/bmjquality.u203314.w1503
[3]. Tal S, Guller V, Levi S, Bardenstien R, Berger D, Gurevich I et al. Profile and prognosis of febrile elderly patients with bacteremic urinary tract infection.J Infect. 2005;50:296-305
[4]. Durgesh D Wasnik, P M Tumane. Prevelance and antibacterial susceptibility pattern of urinary tract infection causing Human pathogenic bacteria.Asian Journal of Biomedical and pharmaceutical Sciences. 2(15); 2012:1-3
[5]. Vaudevan R. Urinary tract infection: An overview of the infection and the associated risk factors. J Microbiol Exp. 2014:1(2):00008 doi:15406/jmen.2014.01.00008
[6]. Kalpana Gupta,Barbara W. Trautner.Urinary Tract Infections, Pyelonephritis an Prostatitis. Harrison's Principles of Internal Medicine. D L Kasper, Anthony S. Fauci, Stephen L. Hauser, Dan L. Longo, J. Larry Jamsen, Joseph Loscalzo: Editors, Mc Graw Hill Education, 19th Edin. Chap.162:861-868
[7]. Mahesh E, Medha Y, Indumati VA, Prithvi SK, Mohammed WK, Punith K. Community acquired UTI in elderly. BJMP. 2011;4(1):a406
[8]. Prakasam AKC, Dileesh KKG, Vijayan M. A cross sectional study on distribution of urinary tract infection and their antibiotic utilisation pattern in Kerala.Int J PharmaTech Res.2012,4(3)1310-6
[9]. Venkatesh RK, Prabhu MM, Nandakumar K, Pai KSR. Urinary tract Infection Treatment Pattern of Elderly patients in a Tertiary Hospital setup in South India: A Prospective Study.J Young Pharm, 2016;8(2):108-113
[10]. Faryabi R, Mathew J, Palaye M, Nair S Shivasankar, Shetty PK et al. Antibiotic utilisation in patients with complicated urinary tract infection in the Medicine wards of a South Indian tertiary care teaching hospital.PBCS.2014;5(4):87-94.
[11]. Marques LP,Flores JT, Barros JOO, Rodrigues GB, Mourao CM,Moreila RM. Epidemiological and clinical aspects of urinary tract infection in community dwelling elderly women. Braz J Infect Dis. 2012;16(5):436-41.
[12]. ChassagneP, Perol MB, Doucet J, Trivalle C, Menard JF, Manchon ND et al.Is presentation of bacterimia in the elderly the same as in younger patients?Am J Med. 1990;150:1465-8
[13]. Richardson JP, Hricz L. Risk factors for the development of bacteremia in nurshing home patients. Arch Fam Med. 1995;4:785-9
[14]. Mayers BR, Sherman E, Mendelson MH, Velasquez G, Srulevitch-Chin E, Hubbard M, Hirschman SZ. Bloodstream infections in the elderly. Am J Med. 1989;86:379-84.
[15]. Katz PR, Beam TR Jr, Brand F, Boyce K. Antibiotic use in the nursing home. Physician practice patterns.Arch Intern Med. 1990;150:1465-8
[16]. Whitelaw DA, Rayner BL, Willcox PA. Community acquired bacteremia in the elderly: A prospective study of 121 cases. J Am Geriatr Soc.1992 Oct;40(10):996-1000.
[17]. Arslan H, Azap OK, Ergonul O,Timurkaynak F. Urinary tract infection study group.Risk factors for ciprofloxacin resistance among Escherchia coli strains isolated from community acquired urinary tract infections in Turkey. Anti-microb Chemother. 2005;56(5):914-8
[18]. Peterson J, Kaul S, Khasab M, Fisher A, Khan 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(10):2215-21
[19]. Behera P K ,Tripathy KP, Mishra SN, Panigrahi R. Microbiological profileand antibiotic sensitivity pattern in community acquired Urinary tract infection : Study from a Tertiary care Hospital.ISOR-J of Dental and Med Sciences.2016;15(9-VI):17-22

[20]. Bonadio M, Costarelli S, Morreli G, Tartaglia T.The influence of Diabetes Mellitus on the spectrum of uropathogens and the antimicrobial resistancein elderly adult patients with urinary tract infection.BMC infct Dis.2006;6:54

[21]. Shalini , Joshi MC, Rashid MK, Joshi HS. Study of antibiotic sensitivity pattern in Urinary tract infection in at a tertiary hospital.NJIRM 2011;2(3)43-6

[22]. Alka Nerurkar,Priti Solanky,Shanta S. Naik. Bacterial Pathogens in urinary tract infection and antibiotic susceptibility pattern.JPBMS.2012;21(12).