

RESEARCH ARTICLE

Urinary Infections in the Elderly: Profile of Antibiotic Sensitivity from a Multicenter Study in Niamey (Niger)

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Abstract

UTI is one of common infectious for which empirical antibiotics are prescribed in elderly without evidence. It occurs antibiotic resistance and its increasing in health public. The purpose of the study was to determine the sensitivity and resistance of drug face to some antibiotic in the elderly in Niamey through a multicenter study.

Material and methods: This is a descriptive cross-sectional study carried out over a period of 3 months from June 1 to August 31, 2022. The study population consisted of all the urine samples collected at the laboratories of the three major hospitals of Niamey for cytobacteriological urine exam.

Results: Of 3757 samples, 110 (2.4%) were at least 60 years old. The average age was 70.8 years with standard deviation 7.4 and extremes of 60 and 93 years. The predominance is male in 77.3% with a majority external exam sent (83.6%). *Escherichia coli* and *Klebsiella spp* were the species frequently isolated. According to the antibiogram, the enterobacteria were sensitivity for fosfomycin, imipenem and amikacin while they were resistant for levofloxacin, Amoxicillin clavulanic- acid and cephalosporin. *E coli* is sensitive for nitrofurantoin and Fosfomycin, resistance for ciprofloxacin, amoxicillin-clavulanic-acid and ceftriaxone. *Klebsiella* was sensitive for nitrofurantoin, cefixime, imipenem and resistant for AMC and ciprofloxacin.

Conclusion: The enterobacteria were sensitive for drug unusually use and expensive while the classic antibiotic became resistant little by little.

Key words: UTIs, Elderly, Antibiotics, Sensitive-resistance, Niger.

1. Introduction

Urinary tract infection (UTI) is defined as an infection of the urinary system that involves the kidneys, urethra, bladder, or ureter, accompanied by infectious manifestations. They are the second frequent infection in elderly and could be severe with sepsis [1]. The incidence of sepsis in UTI is associated of mortality, increases with age and frequently severe in men [2-3]. The diagnosis of UTI in elderly patients can be difficult, due to the atypical symptoms, localised urinary signs compared with the young and the high

frequency of asymptomatic bacteriuria in this range of population [4]. UTI is one of common infectious for which empirical antibiotics are prescribed in elderly without evidence [5-6]. It occurs antibiotic resistance and its increasing threat to public health. The prescription of antibiotic is often being unnecessary and should be done according of antibiogram to avoid resistance, then 30% of urinary isolates *E coli* are resistant to trimethoprim [7]. The aims of the study are to determine the profile of sensitivity of isolates urinary germs in elderly.

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2. Methodology

This was a descriptive cross-sectional study carried out over a period of 3 months from June 1 to August 31, 2022. The study population consisted of all urine samples collected in the laboratories of the three hospitals in Niamey. (General Reference Hospital, Niamey National Hospital and Amirou Boubacar Diallo National Hospital) for ECBU. Included in the study were samples collected and analyzed in the three hospitals in Niamey during the study period from subjects aged 60 and over. These samples came from hospitalized patients (internal patients), or from other extra-hospital (external) health structures. Samples collected and analyzed whose results were lost or illegible during our study period. Three strata were considered according to the laboratory department

of each hospital in Niamey. In each hospital the sampling, antibiotic used for sensitivity-resistance were exhaustive. A documentary review of the laboratory department registers of the three Hospitals was used as a database. A pre-established survey sheet served as data collection and extraction tools. An input mask created on Epi Info (version 7.2.3) served as a tool for recording data from the creation of the database. A descriptive analysis of the variables in the form of tables and figures was carried out. We had previously received research authorization of the authorities of the three hospitals in Niamey. The variables studied were. Average age, gender, origin of urine, clinical complaints, macroscopic appearance, bacteriuria, leukocyturia and bacteriological species identified and antibiotics sensitivity-resistance.

3. Results

Table 1. Sociodemographic and clinical aspects of urine collected. The mean age was 70,8 years with ecart-type +/-7,4157 [60 et 93 years]

Socio-demographic	n =number	Percentage (%)
Sex : Women	25	22,7
Men	85	77,3
Provenance of urin collected		
Extern	92	83,6
Intern	12	16,4
Complains of ECBU		
Urinary pain	63	57,5
Infectious causes	27	24,5
Dysuria	8	7,2
Abdominal pain	10	9
Fever	2	1,8
Comorbidities		
HTA	33	30
Diabetes	4	3
HBP+ diabetes	2	2
No inform	71	65

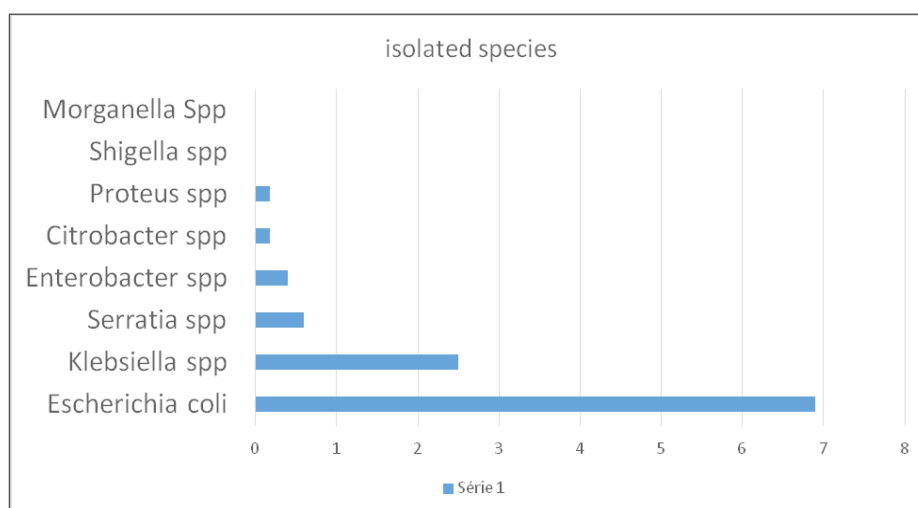


Figure 1. *Escherichia coli* and *klebsiella spp* are the most species bacteria isolated

Table 2. Profile of enterobacteria resistance-sensitivity

Antibiotic	Sensitivity	Resistance
Fosfomycin	70	16
Imipenem	62	8
Amikacin	55	11
Nitrofurantoin	47	4
Ceftazidim	40	53
Ertepenem	44	4
Ceftriaxon	29	63
Cefoxitin	31	34
Gentamycin	31	31
Levofloxacin	23	56
Ciprofloxacin	18	62
AMC	21	80
Aztreonam	4	18
AMX	4	104
Cefixim	5	4
Ticarcillin	1	62

Table 3. Profile of *E coli* sensitivity

Class of antibiotics	Antibiotics	Species tested	Species sensitive	Percentage of species sensitive
Others	Fosfomycin	56	51	91,07
	AMC	61	14	22,95
	Ticarcillin	2	1	50,00
	Imipenem	41	36	87,80
bêta-lactamin	Céfoxitin	43	18	41,86
	Ceftriaxon	58	14	24,14
	Ceftazidim	54	16	29,63
	Aztréonam	12	3	25,00
Aminosid	Amikacin	37	30	81,08
	Gentamycin	36	15	41,67
	Ciprofloxacin	49	7	14,29
Nitrofurane	Nitrofurantoïn	37	36	97,30

Table 4 . Profile of *Klebsiella Spp* sensitivity

Class of antibiotics	Antibiotics	species tested	Species sensitive	Percentage of species sensibles
Others	Fosfomycine	19	11	57,89
	AMC	26	4	15,38
	Imipenem	19	17	89,47
	Céfoxitin	14	10	71,42
bêta-lactamin	Ceftriaxon	22	11	50,00
	Ceftazidim	24	14	58,33
	Cefixim	1	1	100,00
	Aztréonam	6	1	16,67
Aminosid	Amikacin	18	14	77,78
	Gentamycin	18	10	55,56
	Ciprofloxacin	19	7	36,84
Nitrofurane	Nitrofurantoïn	10	9	90,00

4. Discussion and Comments

The rate of UTI in our study was 2,3% with a mean age about 70,8 years old and men predominate in 77,3% of cases. The provenance of urine and others clinical and sociodemographic aspects are précised in table 1. In our study *E coli* was the most species bacteria isolate in urine in 60% of cases. Several studies reported the predominance in urinary tract [8-9] and between species in elderly with a rate to 46 from 71,4% for *E coli* and 11,3 for *Klebsiella spp* [10-11-12]. In our study, the rate of resistance for enterobacteria is higher for amoxicillin, amoxicillin and clavulanic acid and ciprofloxacin. In Chih-Y and al study [12] we found the same trend of resistance for amoxicillin- clavulanic acid, piperacillin/tazobactam, fluoroquinolon and cephalosporin third generation in elderly for *E. coli* [12]. This resistance is also higher in Saka and al study in elderly for nalidixic acid in 81%, nitrofurantoin in 72,7% and amoxicillin in 72% of cases [13]. *Klebsiella spp* specie rate of resistance was high for amoxicillin (94%), amoxicillin clavulanic acid (90%) and nitrofurantoin in 63% of cases. The resistance of species against first line of antibiotic recommended like cephalosporin and fluoroquinolon is known [14]. The large spectrum of this resistance could be explained by the inexistent of antibiotic prescription guidelines for physicians and easy access for certain antibiotic unnecessary by population. Sometimes some antibiotics like trimethoprim (54%), nitrofurantoin and cephalosporin third generation are done on first line without antibiogram [1]. In Drissa and al study [15], *E. coli* was resistant against amoxicillin (81.8%); amoxicillin+clavulanic acid (45.4%) while the sensitivity rate was variable to 72 from 81% for cephalosporin third generation and 27% for trimethoprim. Our study reported a higher sensitivity to *E coli* specie for Fosfomycin, imipenem, nitrofurantoin. Several studies reported this sensitivity to *E coli* for imipenem [15], amikacin [16] and Fosfomycin [17]. The sensitivity for imipenem could be explain by an difficult access for this drug due to the high price in our context while in Europe Esparcia and al reported the resistance to imipenem (33%), sulfamethoxazole+ Trimethoprim for *E coli* [18]. Thibaut and al reported a high sensitivity to Fosfomycin in 95% of cases for *E coli* who corroborate the same result like in our study [19]. *Klebsiella spp* species in our study was sensitive to nitrofurantoin (90%), imipenem (89%), amikacin (77%), Cefoxitin (71%) and ceftriaxon in 50% of cases. Our results are similar than in Drissa and al study with sensitivity for cefoxitin (75%), imipenem (66.6%), ceftazidim

(75%), amikacin (75%) [15]. In Maxwell and al study. *Klebsiella pneumoniae* was more sensitive to amikacin et fosfomycin in 93% respectively and for cephalosporin the sensitivity was from 64 to 77% [20]. In elderly patient, Thibaut and al reported a sensitivity to fosfomycin (75%), Cotrimoxazol (33%), ciprofloxacin (26%) and nalidixic in 19% for [19] *Klebsiella*. In out practice, cotrimoxazole is usually prescribe according to the national guidelines. This policy recommended to use cotrimoxazole in first line against several bacteria and parasitological and fungal species in areas who population had no access to physician and laboratory. It is the same case for ciprofloxacin who is more used without medical prescription in community and hospital.

5. Conclusion

The frequent species in UTIs of elderly are *E coli* and *Klebsiella spp* with sensitivity is higher for antibiotic unusual done and expensive while the resistance is higher to antibiotics with easy access in hospital and community.

6. References

1. Myriam G, Joseph H D, Hannah L, et al . Antibiotic management of urinary tract infection in elderly patients in primary care and its association with bloodstream infections and all cause mortality: population based cohort study 2019. *BMJ* 2019;364: 1525 .
2. Tandogdu Z, Wagenlehner FM. Global urinary tract infections. *Curr Opin Infect Dis*. doi: 10.1097/QCO.0000000000000228)
3. Crnich CJ, Jump RL, Nace DA. Improving Management of Urinary Tract Infections in Older Adults: A Paradigm Shift or Therapeutic Nihilism? *J Am Geriatr Soc* 2017;65:1661-3. doi:10.1111/jgs.14961.
4. Lutters M, Vogt-Ferrier NB. Antibiotic duration for treating uncomplicated, symptomatic lower urinary tract infections in elderly women. *Cochrane Database Syst Rev* 2008;(3):CD001535. doi:10.1002/14651858.CD001535.pub2.
5. Nace DA, Drinka PJ, Crnich CJ. Clinical uncertainties in the approach to long term care residents with possible urinary tract infection. *J Am Med Dir Assoc* 2014;15:133-9.
6. PHE. English surveillance programme for antimicrobial utilisation and resistance. Report 2016. Public Health England: 181
7. Abbo LM, Hooton TM. Antimicrobial Stewardship and Urinary Tract Infections. *Antibiotics Basel* 2014;3:174-92.

8. Yahav D, Eliakim-Raz N, Leibovici L, et al. Bloodstream infections in older patients. *Virulence* 2016;7:341-52.
9. Peach BC, Garvan GJ, Garvan CS, et al. Risk Factors for Urosepsis in Older Adults: A Systematic Review. *Gerontol Geriatr Med* 2016;2:1-7.
10. Hosaka Y, Bito S, Matsubara K, et al. Association between the number of blood cultures and appropriateness of care for suspected bacteremic urinary tract infection in the elderly. *J Infect Chemother* 2011;17:341-50.
11. Chin BS, Kim MS, Han SH, et al. Risk factors of all-cause in-hospital mortality among Korean elderly bacteremic urinary tract infection (UTI) patients. *Arch Gerontol Geriatr* 2011;52:e50-5.
12. Chih-Yen H, Tsung-HC, Yi-CL, et al. Risk factors for uroseptic shock in hospitalized patients aged over 80 years with urinary tract infection. *Ann Transl Med* 2020;8(7):477
13. Saka A.S and B. E. Okunuga. Profiling urinary tract infections bacteria among elderly population in a Nigerian Teaching Hospital . *Journal of Medical and Biomedical Sciences* (2017) 6(3), 15 – 22
14. Beveridge L.A., Davey P.G., Phillips G. et al. Optimal management of urinary tract infections in older people 2011. *Clinical interventions in aging* 6173
15. Drissa S, Magara S, Nanko Doumbia AS F et al. Profile of Urinary Tract Infections in the Elderly in the Internal Medicine Department of the University Hospital Center of Point G, Bamako, Mali. *Open Journal of Nephrology* 2021; 11: 217-229
16. Traoré, A.M., Minta, D.K., Cissé, H., et al. Current Epidemiological and Bacteriological Profile of Urinary Tract Infections in the Infectious Diseases Department of the Point G University Hospital, Bamako. Mali. *Rev 2012. CAMES-Series A*, 13, 122-126.
17. Alami, M., Filali, A., Lahlou, H. et al. Resistance Profile of Escherichia coli Strains Isolated from Urine at Hassan II University Hospital in Fez. *Microbiology Laboratory. 4th Scientific Day 2011, CHU Hassan II, Fez.*
18. Esparcia, A., Artero, A., Eiros, J.M., et al Influence of Adequate Antimicrobial Therapy on Prognosis in Elderly Patients with Severe Urinary Tract Infections. *European Journal of Internal Medicine* 2014, 25, 523-527
19. Thibaut, S., Caillon, J., Marquet, A., et al . Microbiology Laboratories of the MedQual Network Epidemiology of Third-Generation Cephalosporin-Resistant Community Acquired Enterobacteria Isolated from Elderly Patients. *Médecine et Maladies Infectieuses* 2014, 44, 57-62.
20. Wagenlehner, F.M., Weidner, W., Pilatz, A. et al . Urinary Tract Infections and Bacterial Prostatitis in Men. *Current Opinion in Infectious Diseases* 2014, 27, 97-101