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Original Article

Urinary Tract Infection in Adults: A Prospective Study

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ABSTRACT

Urinary tract infection (UTI) remains the common infection in hospitalized patients. Current knowledge on UTI is essential for appropriate therapy. The aim of this prospective study was to evaluate the demographic characteristics, causative agents and antimicrobial sensitivity pattern of urinary tract infection patients. For this purpose 216 symptomatic adult UTI patients of both sexes, admitted in the Medicine Department of Jalalabad Ragib-Rabeya Medical College Hospital (JRRMCH) in between January 2018 to December 2018 were enrolled in the study by convenient sampling technique. The results showed that, UTI was common in female (80.6%) and in married persons (88.9%). Rural population occupied 75% of UTI cases. Middle class (79.6%) and lower class (14.8%) suffered UTI more. It was also common in illiterate (29.6%) and in primary education completed group (36.1%). Among blood group, B+ve patients had highest (36.1%) number of UTI. Among 32.4% recurrent UTI cases female were predominant (80%). In the study, 99.1% patient had significant pyuria and 75% had growth in their urine culture report. Escherichia coli was most common (74.1%) causative microorganism of UTI and type-2 diabetes mellitus (DM) was most common co-morbid disease. The order of antibiotic sensitivity pattern in our study was nitrofurantoin >amikacin >imipenem >meropenem. So, we recommend nitrofurantoin as an excellent oral drug as well as amikacin, imipenem and meropenem as parenteral drugs for UTI treatment.

Keywords: *UTI, Antibiotic sensitivity.*

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INTRODUCTION

Urinary tract infection (UTI), with its diverse clinical syndromes and affected host groups, remains one of the most common but widely misunderstood and challenging infectious diseases encountered in clinical practice[1]. UTI represents one of the most common diseases encountered in medical practice today with an estimated 150 million UTIs per annum worldwide[2]. Although UTIs occur in both men and women, clinical studies suggest that the overall prevalence of UTI is higher in women[3]. An estimated 50% of women experience at least one episode of UTI at some point in their lifetime and between 20% to 40% of women have recurrent episodes[4,5]. Approximately 20% of all UTIs occur in men[6]. UTI is said to exist when pathogenic organisms are detected in the urine, urethra, bladder, kidney or prostate. In most instances, growth of more

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than 10^5 organisms per milliliter from a properly collected midstream clean-catch urine sample indicates infection[7].

The vast majority of UTIs are caused by *Escherichia coli*, with other pathogens including *Enterococci, Staphylcoccus saprophyticus, Klebsiella species and Proteus mirabilis*[8]. Recurrent UTIs are symptomatic UTIs that follow resolution of an earlier episode, usually after appropriate treatment[9]. 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[10]. To ensure appropriate treatment, knowledge of the organisms that cause UTI and their antibiotic susceptibility is mandatory[11]. The aim of this prospective study was to evaluate the demographic characteristics, causative agents and antimicrobial sensitivity pattern of urinary tract infection patients in JRRMCH.

MATERIALS AND METHODS

This prospective study was conducted on symptomatic adult (>18 years of age) UTI patients of both sexes admitted in the department of Medicine, Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet in between January 2018 to December 2018. For this purpose, clean-catch midstream urine specimens were collected from 216 clinically diagnosed UTI patients on the basis of symptoms. Sampling was done by convenient sampling technique. Pregnant women, patients with structural lesions in genito-urinary tract and those who disagreed to participate were excluded from the study. Urine routine microscopic examination, urine culture, antimicrobial sensitivity testing by Kirby Bauer's disc diffusion method, ABO blood grouping and Rh typing by Forwarded method were carried out for each of the sample. Standard microbiological procedure was strictly applied to culture the urine samples for identifying bacterial causative agent followed by antimicrobial sensitivity testing. The antibiotics were chosen according to clinical and laboratory standard institute (CLSI) guideline. Ethical issues were maintained properly and informed written consent was taken from each participant. All the demographic data were recorded by direct interviewing in a congenial environment. Data analysis was performed using descriptive statistics and results were summarized as frequencies and percentages.

RESULTS

In our study, total numbers of patients were 216. Among them 21.3% patients were successively in 58 to 67 years and 20.4% patients were in 28-37 years age group with female preponderance (80.6%). Among them 88.9% were married. Rural population occupied 75% of UTI cases. UTI was common among the patients from the middle income family (monthly income 8350-18400 BDT) (79.6%). In education category, UTI was common in illiterate (29.6%) and primary education completed group (36.1%). Among blood group, B+ve patients (36.1%) were the highest number of UTI suffered cases (Table-I). In this study, 67.6% patients were new and 32.4% were recurrent (Table-II). Here we found, 80% recurrent cases were female (Table-III). In the current study, 99.1% patient had significant pyuria in urine routine microscopic examination and 75% had growth in their urine culture report (Table-IV). Among the causative microorganisms of UTI, *Escherichia coli* were 74.1%, *Klebsiella species* 14.9%, *Pseudomonas species* 4.9%, *Enterococci species* 4.9% and *Staphylococcus aureus* were 1.2% (Figure-1). Among the 216 tested samples 162 samples were sensitive to different drugs. Among them 76.5% patient were sensitive to nitrofurantoin, 75.3% to amikacin, 71.6% to imipenem and 59.3%, to meropenem (Figure-2). Associated most common co-morbid disease was type-2 DM (Table- V).

Table-I: *Distribution of patients by demographic characteristics (n=216).*

Characters	Frequency	Percentage
Age (In years)		
18-27	28	13
28-37	44	20.4
38-47	24	11.1
48-57	34	15.7
58-67	46	21.3
68-77	20	9.3
78-87	18	8.3
>88	2	0.9
Sex		
Male	42	19.4
Female	174	80.6
Marital Status		
Married	192	88.9
Unmarried	24	11.1
Residence		
Urban	54	25
Rural	162	75

Characters	Frequency	Percentage
Monthly Family Income		
>18400 BDT	12	5.6
8350-18400 BDT	172	79.6
<8350 BDT	32	14.8
Education		
Illiterate	78	36.1
Up to primary	64	29.6
Up to secondary	60	27.8
Higher education	14	6.5
Blood group		
A+ve	34	15.7
A-ve	4	1.9
B+ve	78	36.1
B-ve	4	1.9
O+ve	66	30.5
O-ve	10	4.6
AB+ve	14	6.5
AB-ve	6	2.8
Total	216	100

Table-II: *Distribution of patient according to pattern of UTI (n=216).*

Pattern of UTI	Frequency	Percentage
New case	146	67.6
Recurrent	70	32.4
Total	216	100

Table-III: *Recurrent UTI in different sex (n=70).*

Sex	Frequency	Percentage
Female	56	80
Male	14	20
Total	70	100

Table-IV: *Distribution of patient according to urine investigation reports (n=216).*

Urine Investigation Reports	Frequency	Percentage
Urine routine microscopic examination report		
Pyuria	214	99.1
No pyuria	2	0.9
Urinary culture sensitivity report		
Growth present	162	75
Growth absent	54	25
Total	216	100

Pus cell >8/ High power field (HPF) = pyuria[12]

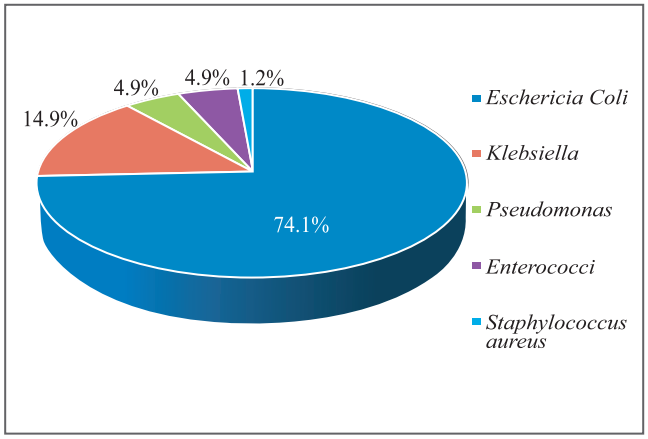

Figure-1: *Pattern of microorganisms isolated from urine culture (n=162).*

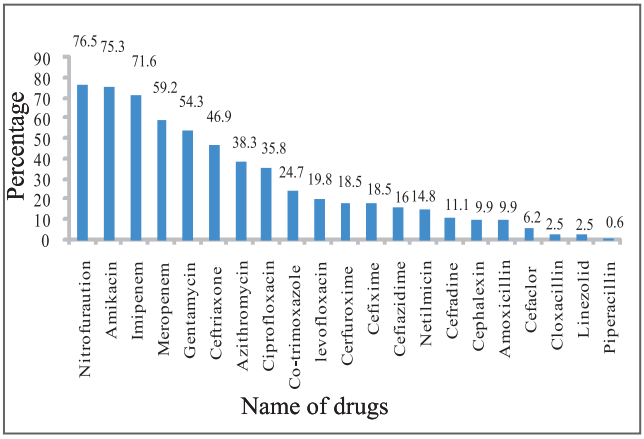

Figure-2: *Overall percentage of uropathogens sensitivity to antibiotics (n=162).*
(More than one drug were considered in one respondents)

Table-V: *Associated co-morbid common diseases with UTI (n=216).*

Name of Co-morbid Diseases	Frequency	Percentage
Type 2 DM	86	39.8
Hypertension	80	37
Chronic kidney disease	26	12
Ischaemic heart disease	24	11.1
Asthma	24	11.1
Stroke	22	10.1
Osteoarthritis	20	9.3
Chronic obstructive pulmonary disease	18	8.3
Peptic ulcer disease	16	7.4
Anxiety disorder	16	7.4
Hypothyroidism	8	3.8
Pulmonary tuberculosis	8	3.8
Hyperthyroidism	6	2.8

(More than one disease were considered in one respondents)

DISCUSSION

In the current study among 216 patients, 21.3% and 20.4% UTI cases were from 58 to 67 years and 28 to 37 years group respectively irrespective of sex. Biswas et al.[13] found elderly (50-90 years) males had a higher incidence of UTI (23.64%) compared to the elderly females (11.81%) and Yasmeen et al.[14] found majority of the UTI cases reported from the age group of 21 to 30 years and least patients from more than 70 years of age group in their studies. It signified that, UTI might occur in all age groups. We found 80.6% cases were female and 19.4% were male which was almost similar to a Bangladeshi study, where they also found, prevalence of UTI was high among females (68.18%) than males (31.82%)[13]. It recognized that, short urethra with closure proximity with anus and certain behavioral factors were some important predisposing factors for UTI in female. In our study 88.9% cases of UTI patients were married. But Muthulakshmi et al.[15] found age, religion and marital status showed no significant association with UTI in their study. The difference could be due to more female patientss were enrolled in our study. Our study revealed that, middle class (79.6%) and lower class (14.8%) suffered UTI and in education category, UTI was common in illiterate and in primary education completed group which is 29.6% and 36.1% respectively. The findings closely resembled to a study in India that showed strong statistical significance between UTI patients with illiteracy and low socioeconomic status[15]. Regarding residence, we found rural population occupied 75% and urban 25% UTI cases and it was near similar to a study by Lusignan et al[16]. They found, urban dwellers were less likely to present to a general practitioners with UTI but higher in conurbation dwellers. They summarized that, conurbation and rural living were associated with an increased risk of UTI[16]. It revealed urbanization was an important determinant of health and it might create incubators for infectious diseases. Among blood group, B+ve patients (36.1%) had highest number of UTI in the present study. Another study by Rocha et al.[17] found a relationship of association with the susceptibility of A phenotype and UTI, being the results statistically significant. There were several publications that defined enhanced bacterial adhesions due to genetic markers such as blood group types. As there had been an ongoing interest in the potential role of blood groups in infectious diseases, we suggested that before defining the relationships on genetical markers, it would be more reliable to correlate them with their local distributions in the population. In this study, among all cases 67.6% cases were new and 32.4% were recurrent UTI which was similar to a study by Arunachalam et al.[18] where the rate was 32.3%. Among recurrent cases, we found 80% were female. A study in Saudi Arabia reported 10-20% of women with UTI had recurrent episodes[19]. The high rate of recurrence in female of our study might be due to lack of adequate attention from the preventive perspective of our country. In present study, 99.1% patient had pyuria in urine routine microscopic examination and 75% had growth in their urine culture report. This study revealed, *Escherichia coli* (74.1%,) followed by *Klebsiella species* (14.9%), *Pseudomonas species* (4.9%), *Enterococci species* (4.9%), S*taphylococcus aureus* (1.2%) among the causative microorganisms of UTI which was similar to a study in Bangladesh from January 2013 to December 2013[20]. They isolated gram negative uropathogens, *Escherichia coli* (63.93%) followed by *Klebsiella species* (17.09%), *Pseudomonas species*, *Enterobacter species*, *Acinetobacter species*. *Citrobacter species*, *Proteus species* and gram positive organisms *Staphylococcus aureus*, *Staphylococcus saprophyticus*, *Streptococcus agalectiae* and *Enterococci*. Some differences also found in another study of Bangladesh where the commonest isolates were *Escherichia coli* followed by *Enterococci species*, *Pseudomonas species*, *Proteus species*, *Staphylococcus aureus* and *Klebsiella species*. These represented 58.18%, 13.63%, 9.09%, 8.18%, 4.54% and 3.63% of isolate respectively[13]. *Escherichia coli* was commonest organism in all study but others differs that might be due to different environmental condition, host factor, hygiene practice and socioeconomic condition. Of the 216 tested samples 162 samples were sensitive to different drugs. Among them 76.5% patients were sensitive to nitrofurantoin, 75.3% were to amikacin, 71.6% were to imipenem and 59.3%, were to meropenem. The order of antibiotic sensitivity pattern in our study was nitrofurantoin >amikacin >imipenem >meropenem >gentamycin >ceftriaxone >azithromcin >ciprofloxacin >cotrimoxazole >levofloxaci >cefuroxime >cefixime. Another study in Bangladesh showed their order of sensitivity to imipenem first followed by amikacin, nitrofurantoin, ceftriaxone, gentamicin, cefuroxime in most of the isolates. They recommended most effective antimicrobial agents in their study were imipenem, and amikacin[20] and we recommend that, nitrofurantoin could be considered as an excellent oral therapeutic option and amikacin, imipenem and meropenem as parenteral options. Associated common co-morbid diseases in this study were type 2 DM (39.8%), hypertension (37%) and

chronic kidney disease (12%) which was near similar to a study in Saudi Arabia where they had found risk factors of UTI were DM, hypertension and nephropathy (microalbuminuria)[21].

CONCLUSION

This study revealed that, *Escherichia coli* was the predominant bacterial pathogens of UTIs. We recommend nitrofurantoin as an excellent oral drug and amikacin, imipenem and meropenem as parenteral drugs for UTI treatment. Policy-making bodies and professional societies should prioritize the inappropriate use of antibiotics and thus we can avoid drug resistance. Increase awareness about UTI will help to its prevention specially among female.

REFERENCES

1. Mohsin R, Siddiqui KM. Recurrent urinary tract infections in females. J Pak Med Assoc 2010; 60(1): 55-9.
2. Karlowsky JA, Kelly LJ, Thornsberry C, Jones ME, Sahm DF. Trends in antimicrobial resistance among urinary tract infection isolates of Escherichia coli from female outpatients in the United States. Antimicrob Agents Chemother 2002; 46(8): 2540-5.
3. De Backer D, Christiaens T, Heytens S, De Sutter A, Stobberingh EE, Verschraegen G. Evolution of bacterial susceptibility pattern of Escherichia coli in uncomplicated urinary tract infections in a country with high antibiotic consumption: a comparison of two surveys with a 10 year interval. J Antimicrob Chemother 2008; 62(2): 364-8.
4. Rock W, Colodner R, Chazan B, Elias M, Raz R. Ten years surveillance of antimicrobial susceptibility of community-acquired Escherichia coli and other uropathogens in Northern Israel (1995-2005). Isr Med Assoc J 2007; 9(11): 803-5
5. Vasquez Y, Hand WL. Antibiotic Susceptibility Patterns of Community-Acquired Urinary Tract Infection Isolates from Female Patients on the US (Texas)-Mexico Border. J Appl Res 2004; 4(2): 321-6.
6. Griebling TL. Urinary tract infection in men. In: Litwin MS, Saigal CS, editors. Urologic Diseases in America. Washington DC: NIH publication; 2007. p 621-45.
7. Stamm WE, Schaeffer AJ. The state of the Art in the management of urinary tract infections. Am J Med 2002; 113(supp 1A): 5S-13S.
8. Blondeau JM. Current issues in the management of urinary tract infections; extended-release ciprofloxacin as a novel treatment option. Drugs 2004; 64 (6): 611-28.
9. Hooton TM. Recurrent urinary tract infection in women. Int J Antimicrob Agents 2001; 17(4): 259-68.
10. Goldstein FW. Antibiotic susceptibility of bacterial strains isolated from patients with community-acquired urinary tract infections in France. Multicentre Study Group. Eur J Clin Microbial Infect Dis 2000; 19(2): 112-7.
11. Ashkenazi S, Even-Tov S, Samra Z, Dinari G. .Uropathogens of various childhood populations and their antibiotic susceptibility. Pediatr Infect Dis J 1991; 10(10): 742-6.
12. McPherson RA, Ben-Ezra J. Basic examination of urine. In: McPherson RA, Pincus MR, editors. Henry's clinical diagnosis and management by laboratory methods. 23rd ed. St Louis, Missouri: Elsevier; 2017. p 461-2.
13. Biswas R, Rabbani R, Ahmed HS, Sarker MAS, Zafrin N, Rahman MM. Antibiotic sensitivity pattern of urinary tract infection at a tertiary care hospital Bangladesh Crit Care J 2014; 2 (1): 21-4
14. Yasmeen BHN, Islam S, Uddin MM, Jahan R. Prevalence of urinary tract infection, its causative agents antibiotic sensitivity pattern: A study in Northern International Medical College Hospital, Dhaka. North Int Med Coll J 2015; 7 (1): 105-9.
15. Muthulakshmi M, Gopalakrishnan S. Study on urinary tract infection among females of reproductive age group in a rural area of Kancheepuram district, Tamil Nadu. Int J Community Med Public Health 2017; 4(10): 3915-21.
16. de Lusignan S, McGee C, Webb R, Joy M, Byford R, Yonova I, et al. Conurbation, Urban and Rural Living as Determinants of Allergies and Infectious Diseases: Royal College of General Practitioners Research and Surveillance Centre Annual Report 2016-2017. JMIR Public Health Surveill 2018; 4(4): e11354.
17. Rocha D, Silva A, Pereira A, Borges A, Rodrigues E, Mendonça V, et al. Urinary tract infections and blood groups: Do they relate? IIJMMS 2015; 2(5): 66-72.

18. Arunachalam U, Ponmudi C, Prashant V, Solanke, Das D, Vignesh N, et al. A study about urinary tract infection among patients attending tertiary care hospital. Int Surg J 2017; 4(8): 2620-2.

19. Zeyaullah M, Kaul V. Prevalence of urinary tract infection and antibiotic resistance pattern in saudi arabia population. GJBAHS 2015; 4(1): 206-14.

20. Setu SK, Sattar ANI, Saleh AA, Roy CK, Ahmed M, Muhammadullah S, et al. Study of Bacterial pathogens in Urinary Tract Infection and their antibiotic resistance profile in a tertiary care hospital of Bangladesh. Bangladesh J Med Microbiol 2016; 10(1): 22-6.

21. Al-Rubeaan KA, Moharram O, Al-Naqeb D, Hassan A, Rafiullah MR. Prevalence of urinary tract infection and risk factors among Saudi patients with diabetes. World J Urol 2013; 31(3): 573-8.