

FREQUENCY AND SUSCEPTIBILITY PROFILE OF PATHOGEN CAUSING URINARY TRACT INFECTION AT TERTIARY CARE HOSPITAL, PESHAWAR PAKISTAN

Tanveer Tara¹, Asad Ullah², Izhar Ul Haq³, Naeem Ullah⁴, Muhammad Hassan⁵, Muhammad Umair⁶

Authors' Affiliation

¹Department of Medical Laboratory Technology, National Skills University Islamabad

^{2,3}Department of Health and Biological Sciences, Abasyn University Peshawar

⁴Department of Pathology, Northwest Institute of Health Science Peshawar

⁵Jingangshan University China

⁶Department Medical of Laboratory Technology, University of Haripur, Haripur

Corresponding Author

Tanveer Tara

Lecturer, Department of Medical Laboratory Technology, National Skills University Islamabad

Email: tanveer.tara@nsu.edu.pk

ABSTRACT

Objective: To determine the prevalence and antibiotic resistance trend of urinary microbes obtained from urine samples of suspected hospitalized patients with urinary infections at a tertiary care hospital in Peshawar, Pakistan.

Material & Methods: The current study was a cross-sectional study with an analysis of patients who were admitted for urinary tract infection (UTI) at the tertiary care hospital in Peshawar Pakistan.

Results: A total of 145 participants were included and were selected among which 119 (82.1 %) infected patients were female, while 26 (17.9%) were male. UTI was most commonly seen in the age group of 20 to 60 years as 68.96% (100 cases) were reported). E.coli was the most frequently isolated organism with a frequency of 104 (71.8%) causing UTI. The Imipenem and fosfomycin was observed as most sensitive drug with 100% sensitivity for UTI, followed by penicillin, meropenem, nitrofurantoin, and gentamicin with a sensitivity of 94.7%, 89%, 82% and, 79.5% respectively.

Conclusion: It is concluded that E. coli was the most common pathogen responsible for UTI followed by Staph. aureus, Klebsiella and Serratia. The Imipenem was observed as the most effective antibiotic against the common pathogens.

Key Words: Antibiotic, Antimicrobial, Infection, Urinary Tract

This article may be cited as: Tara T., Ullah A., Haq IU., Ullah N., Hassan M., Umair M. Frequency and susceptibility profile of pathogen causing urinary tract infection at tertiary care hospital, Peshawar Pakistan. Ann Allied Health Sci. 2022;8(1):23-27.

INTRODUCTION

Urinary tract infection (UTI) is accounted for the major cause of morbidity in population, while second most common cause of infections in people visiting the hospital.¹ Because of prostate enlargement and neurogenic bladder, the UTI prevalence is increases with age of males.² The recurrent infections of UTI is more prevalent in population which lead to the permanent renal damage and subsequently causes renal hypertension and renal failure.³ Generally, females are more prone to establish the UTI compare to males in the population. A single episode of UTI affects about 20% of women at some point in life and 3% of women experience

multiple UTI episodes in one year.⁴ Women are even more prone to infection when pregnant.⁵ UTIs are more commonly found in woman because they are more susceptible due to the shorter urethra and near to the anus. UTI caused by a catheter is a serious issue, because approximately 5% of catheterized patients experience bacteriuria.⁶ Microscopy and microbial culture are the only ways to determine whether you have a UTI. Many centers use the dipstick or dip slide approach for screening purposes, but culture of the sample is required for accurate diagnosis. In hospitalized patients, UTI is the major cause of nosocomial infection.⁷ Treatment should always be started on the basis of existing findings prior to the final

microbiological investigations. Area specific screening research aimed to learning more about the pathogens that cause UTIs and their susceptibility trends may help clinicians in selecting the most appropriate empirical therapy. Increased resistance to urinary pathogens to widely used antibiotics has been seen in studies from Nepal's eastern region, Bangladesh and India.⁸⁻¹⁰ Therefore, the present study was conducted to determine the prevalence and the trend of antibiotic resistance of urinary microbes obtained from urine samples of suspected hospitalized patients with urinary infections at tertiary care hospital in Peshawar, Pakistan.

MATERIAL AND METHODS

The current study was a cross sectional study with analysis of patients who were admitted for UTI in the department of general medicine at northwest general hospital and research center Peshawar, Pakistan. The study was conducted on 145 patients using simple random sampling technique. The clean catch mid-stream 20 ml urine was collected in hygienic condition from 145 patients using convenience sampling technique. The sample was properly labeled and sent to the laboratory for analysis. All the participants were properly instructed about samples collection aseptically. Informed consent was taken verbally from all participants before collecting sample.

For the isolation and identification of bacteria in urinary samples, a calibrated loop technique was used. A 4 mm platinum wire loop with 0.001 ml capability was used. The urine sample was taken with the help of loop and the sample was inoculated on cysteine lactose electrolyte deficient (CLED), MacConkey and blood agar medium. The sample was inoculated separately on each media and then plates having inoculum were incubated for 24 hours at 37 °C and 48 hours incubation period were given to negative samples as recommended. Furthermore, a specimen was reported positive for UTI if the inoculated organisms are grown at the >10 cfu/ml concentration and pus cells >5 per high power field in urine microscopic examination.

The research was performed after the obtaining approval from hospital ethical and research committee. All the patients visiting Northwest General Hospital and diagnosed as UTI were included in the current study after the culturing each sample on MacConkey agar and blood agar. The positive samples were subjected to sub-culture for Anti-microbial susceptibility testing. The data were analyzed through Statistical Package for Social Sciences version 22.0.

RESULTS

Sensitivity of the antimicrobial drugs are determined and summarized. It was observed that *E. coli* is highly sensitive to imipenem 100% and fosfomycine 100% followed by penicillin 94.7%, meropenem 89%, nitrofurantoin 82 and gentamicin 79.5%, while highly resistant to clindamycin 93% and trimethoprim (88%). *Staph. aureus* was observed as the second most abundant UTI pathogen with sensitivity of 100% against meropenem followed by imipenem (80%), nitrofurantoin (75%) and gentamicin (75%). The *Klebsiella* and *Serratia* are the third most prevalent pathogens show higher sensitivity against imipenem (100%), meropenem (100%) and fosfomycin (100%), gentamicin (100%), imipenem (100%). (Table 1) In total of 145 cases fulfilling the inclusion criteria were selected among which 119 (82.1 %) patients were female, while 26 (17.9%) were male. UTI was common in female (82.1 %) with female to male ratio about 4:1. It was observed that UTI was most frequent in the age group 20-60 years as 68.96% (n=100) followed by age less than 20 years 20% (n=29). UTI was observed in very less in the older age 11.03% (n=16). The pathogens identified as causative agents in the study. Among these, the *E. coli* was the leading isolated organism is UTI causing 71.8% (n=104) infections. Other bacterial pathogen such as *Staph. aureus* were noted with 6.2% (n=9), *Klebsiella* 4.8% (n=7), *Serratia* 4.8% (n=7), *Enterobacter* 4.1% (n=6), *Pseudomonas* 2.7% (n=4), *Citrobacter* 2% (n=3), *Providencia* 1.3% (n=2), *MRSA* 1.3% (n=2) and *Proteus mirabilis* 0.6% (n=1)..

Table 1. Sensitivity and resistance of different antibiotics in UTI

Drugs	Sensitivity/ Resistance	Organisms											
		E. coli	Serratia	Enterococcus	Pseudomonas	Enterobactor	Citrobactor	Providencia	MRSA	Klebsiella	Protieus	Mirabilinc Staph. aureus	Staphylococcus
Trimethoprim	Sensitive %	11.5	0	0	100	33.3	33.3	25	33.3	0	0	0	0
	Resistance %	88.4	100	100	0	66.6	66.6	75	66.6	100	100	100	100
Sulzone	Sensitive %	80	-	-	20	-	-	-	-	40	-	-	-
	Resistance %	20	-	-	80	-	-	-	-	60	-	-	-
Cefotaxime	Sensitive %	13.4	0	-	25	20	33.3	-	0	-	-	-	0
	Resistance %	86.5	100	-	75	80	66.6	-	100	-	-	-	100
Amikacin	Sensitive %	100	-	-	50	0	-	-	-	-	-	-	-
	Resistance %	0	-	-	50	100	-	-	-	-	-	-	-
Fosfomycin	Sensitive %	100	-	-	-	-	-	40	-	60	-	60	-
	Resistance %	0	-	-	-	-	-	60	-	40	-	40	-
Septran	Sensitive %	25.2	0	-	-	20	66.6	0	50	40	-	-	-
	Resistance %	74.7	100	-	-	80	33.3	100	50	60	-	-	-
Ciprofloxacin	Sensitive %	48	0	-	60	20	33.3	0	-	20	-	-	-
	Resistance %	52	100	-	40	40	66.6	100	-	80	-	-	-
Augmentin	Sensitive %	21	05	0	-	16.6	33.3	0	0	20	0%	25	-
	Resistance %	79	95	100	-	83.3	66.6	100	100	80	100	75	-
Nitrofurantoin	Sensitive %	82	100	-	-	33.3	33.3	50	-	80	0	75	0
	Resistance %	18	0	-	-	66.6	66.6	50	-	20	100	25	100

DISCUSSION

Effective bacterial UTIs patient management usually depends on organism identification and its type which caused disease and the effective antibiotic agent against the organism. The UTI diagnosis is a best example which reveals the need of close cooperation between microbiologist and clinician.¹¹ Bacterial resistance to antibiotics is a microbial natural response antimicrobial drug. Most commonly UTI was observed in the 21-40 years age group and the total of 54.98% samples were in this age group. The UTI cases among females were commonly observed in the age group of 21-40 years and in males it was 41-60 years age group.¹²

We reported UTI cases more in females when it was compared to males and the same trend of the cases in male and female were reported by other studies.¹³ In the present study, the UTI was common in female (82.1%) with female to male ratio about 4:1. The UTI cases among females were commonly observed in the age group of 21-40 years and in males it was 41-60 years age group. These results were consistent with another study.¹⁴ We reported *E. coli* as the leading pathogen, *Staph. aureus* as the second common and *Klebsiella* as the third common pathogen in UTI, and other studies reported the same trend of the pathogens.¹⁴

In the present study *E. coli* is observed as highly sensitive to imipenem (100%) and Fosfomycine (100%) and a published study also reported the effectively in complicated and uncomplicated *E. coli* infections.¹⁵ We reported imipenem with 80% sensitivity against *Staph. aureus* in UTI while another published study reported 98% sensitivity.¹⁶ We observed imipenem and meropenem as 100% sensitive against *Klebsiella* in UTI and another published report also proved these drugs as highly sensitive drugs with

sensitivity of 91.6% and 83% against *klebsella*.¹⁷⁻¹⁸ The slight variations in the results may be due to geographical, environmental and variations in genetics.

CONCLUSION

The current study concluded that UTI is more prevalent in female than male and caused by *E. coli* followed by *Citrobacter* and *Klebsiella*. The *E. coli* was found prevalent among the isolated bacteria from participants suffering from UTI. The Imipenem and Fosfomycin were observed as the more effective anti-microbial agents against *E. coli*.

REFERENCES

1. Tabassum N, Akter A, Acharjee M. Prevalence of Urinary Tract Infection among the Patients Admitted in the Brahmanbaria Medical College Hospital in Bangladesh. *Merit Research Journal of Medicine and Medical Sciences*. 2020;8(5).
2. Skow MA, Vik I, Høye S. Antibiotic switch after treatment with UTI antibiotics in male patients. *Infectious Diseases*. 2020 Jun 2;52(6):405-12.
3. Czajkowski K, Broś-Konopielko M, Teliga-Czajkowska J. Urinary tract infection in women. *Przegląd Menopauzalny= Menopause Review*. 2021 Apr;20(1):40.
4. Okwu M, Imade O, Akpoka OA, Olley M, Ashi-ingwu B. Prevalence of Asymptomatic Bacteriuria among Pregnant Women Attending Antenatal Clinics in Ovia North East Local Government Area, Edo State, Nigeria. *Iranian Journal of Medical Microbiology*. 2021 Mar 10;15(2):227-31.
5. Yeta KI, Michelo C, Jacobs C. Antimicrobial Resistance among Pregnant Women with Urinary Tract Infections Attending Antenatal Clinic at Levy Mwanawasa University Teaching Hospital (LMUTH), Lusaka, Zambia. *International journal of microbiology*. 2021 Mar 4;2021..
6. Devrim F, Çağlar İ, Demiray N, Oruç Y, Ayhan Y, Ağın H, Çalkavur Ş, Bayram N, Devrim İ. Bacteremia due to healthcare-

associated urinary tract infections in children. Archives de Pédiatrie. 2021 Feb 1;28(2):147-9.

7. Van Nostrand JD, Junkins AD, Bartholdi RK. Poor predictive ability of urinalysis and microscopic examination to detect urinary tract infection. Am J ClinPathol 2000; 113:709-13.

8. Navaneeth BV, Belwadi S, Suganthi N. Urinary pathogens resistance to common antibiotics: a retrospective analysis. Trop Doct 2002; 32:20-2.

9. Iqbal J, Rahman M, Kabir MS, Rahman M. Increasing ciprofloxacin resistance among prevalent urinary tract bacterial isolates in Bangladesh. Jpn J Med SciBiol 1997; 50:241-50.

10. Stamm WE. Measurement of pyuria and its relation with bacteriuria. Am J Med 1983; 75:53-8.

11. Harikrishnan s, vennila r, monica r. Isolation and characterisation of anti-bacterial resistance patterns of bacterial isolates from urinary tract infection in diabetics. International journal of current pharmaceutical research. 2021 jan 15:57-9.

12. Bloukh SI, Hassan NA, AlAni RS, Gacem SA. Urinary tract infection and antibiotic resistance among pregnant and Non-pregnant females in UAE. Research Journal of Pharmacy and Technology. 2021 Jan 29;14(1):461-5.

13. Bai Y, Liu Q, Gu J, Zhang X, Hu S. Analysis of Urinary Pathogen Cultures and Drug Sensitivity in Patients with Urinary Stones for Five Consecutive Years in Xiangya Hospital, China. Infection and Drug Resistance. 2020;13:1357.

14. Razak SK, Gurushantappa V. Bacteriology of urinary tract infection and antibiotic susceptibility pattern in a tertiary care hospital in South India. Int J Med Sci Public Health. 2012 Jan 1;1(2):109-2..

15. Ronald A, Pattullo A. The natural history of urinary infection in adults. The Medical clinics of North America. 1991;75(2):299-312.

16. Lipsky BA. Urinary tract infections in men: epidemiology, pathophysiology, diagnosis, and treatment. Annals of internal medicine. 1989;110(2):138-50.

17. Obiobolu C, Okonko I, Anyamere C, Adedeji A, Akanbi AO, Ogun A, et al. Incidence of urinary tract infections (UTIs) among pregnant women in Akwa metropolis, Southeastern Nigeria. Scientific Research and Essays. 2009;4(8):820-4.

18. Oak R. Phisher's Net: A Tool For Understanding And Preventing Phishing Attacks. Journal of Positive School Psychology. 2020;4(1):92-7.

