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ORIGINAL ARTICLE

Pattern of bacteriology and antibiotic sensitivity in admitted patients of urinary tract infections.

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ABSTRACT... Objective: To find out frequency of type of bacteria and antibiotic sensitivity in admitted patients of urinary tract infections. **Study Design:** Cross-sectional study. **Setting:** Medical Emergency Ward and Medical Unit-II, Allied Hospital, Faisalabad. **Period:** 01-01-2023 to 30-06-2023. **Methods:** Eligible patients were recruited in the research. History After, physical, and urine analysis diagnosed urinary tract infection. Bacteria were tested after 24 hours. If no growth was found, material was stored for 24 hours and lab report was retrieved after 48 hours. Every antibiotic's inhibition zone was assessed and sensitivity was reported. **Results:** Mean age was 42.62+12.29 years, 31 (20.7%) were male, 119(79.3%) were female. E.coli was isolated in 65 (43.3%) cases, Coagulase Negative Staphylococci (CONS) was isolated in 70 (46.7%), Enterococcus in 6 (4%), and S.Aureus in 9 (6%) cases. **Conclusion:** We concluded that Coagulase Negative Staphylococci (CONS) and E.Coli as the leading type of bacteria found UTI whereas Nitrofurantoin, Ciprofloxacin, Cefotaxime and Vancomycin are highly sensitive for these pathogens.

Key words: Common Bacteria, Sensitivity Antibiotic, Urinary Tract Infection.

INTRODUCTION

Urinary tract infections (UTI) are among the most common infections in adults, predominately caused by bacterial pathogens. Infection of the upper urinary tract is generally termed as pyelonephritis while that of the lower urinary tract as cystitis. The diagnosis of urinary tract infection is generally based on a combination of symptoms and a positive urine culture.[1] UTIs are common in all age groups, especially common in females due to short urinary tract[2] and in older men due to obstructive uropathy.[3] It is also one of most leading cause of sepsis in hospitalized patients especially in catheterized patients.[4] In United States, the prevalence of urinary tract infection in females over 65 years of age is approximately 20%, compared with approximately 11% in the overall population.[5] As per another study, adult women are thirty times more likely than men to develop UTI, with almost half of them experiencing at least one episode in their lives.[6] UTIs are generally classified as uncomplicated, acute uncomplicated cystitis, acute un-complicated pyelonephritis, recurrent UTIs and asymptomatic bacteriuria.[7] Most of the times, imaging studies are requested to aid with the diagnosis, identifying the precipitating factors and complications related to UTI.[8] Common complications of UTI include recurrent UTI, acute pyelonephritis, urethral stricture, peri-nephric abscess, papillary necrosis, acute kidney injury (AKI), sepsis and even septic shock. Most common bacteria involved are E. coli, Coagulase negative staphylococci (CONS), Enterococcus and S. aureus. Mostly, these bacteria show sensitivity to antibiotics like Amikacin, Tobramycin, Fosfomycin[9] Gentamicin, Nitrofurantoin, Vancomycin, Ciprofloxacin[10] and Carbopenems.[11,12] In one study, E. coli was found in 35.1% cases of UTI, Coagulase negative staphylococci (CONS) was found in 18.9% cases, Enterococcus was found in 16.2% cases and S. aureus was found in 10.8% cases (13).

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In the same study, E. coli showed sensitivity to Nitrofurantoin and ciprofloxacin in 100% cases, CONS showed sensitivity to Cefotaxime and nitrofurantoin in 85.7% cases, Enterococci showed sensitivity to Ciprofloxacin in 100% cases and to vancomycin in 83.3% cases while S.aureus showed sensitivity to vancomycin in 82.2 % cases.[13] The rationale of this study is to find out common bacterial causes of urinary tract infections in hospitalized patients, to know the sensitivity of antibiotics, in order to make more effective empirical therapy to treat urinary tract infections without increasing antibiotic sensitivity and excessive use of undesired antibiotics.

OBJECTIVE

To find out frequency of type of bacteria and antibiotic sensitivity in admitted patients of urinary tract infections.

METHODS

This Cross-sectional study was conducted at Medical Emergency Ward and Medical Unit-II, Allied Hospital, Faisalabad from Six (6) months i.e. from: 01-01-2023 to 30-06-2023.The sampling technique use was Non-probability consecutive sampling. The sample size was 150.

Inclusion Criteria

Patients of either gender aged 18-65 years presenting with urinary tract infections were included in study.

Exclusion Criteria

Patients having source of infection other than or along with urinary system such as respiratory system or gastrointestinal system, patients who had started antibiotics prior to the sampling for urine culture and sensitivity, immuno-compromised patients and pregnant females were excluded from study.

Data Collection

After approval of the hospital ethical board (48 ERC/FMU/2021-22/216), patients were enrolled in the study. The data including gender, age, height, weight and co-morbid conditions such as diabetes and hypertension was noted. Diagnosis of urinary tract infection was made on the basis of history, examination and urine complete examination. For sampling, a mid-stream sample of urine was preferably taken and sent to the laboratory. CLED agar was used for bacterial culture. After 24 hours, the sample was checked for any bacterial growth. If no growth is found, then the sample was kept for another 24 hours and the final report after 48 hours was collected from the laboratory. The final outcome of the report was noted whether the growth is found on culture media or not. Lactose fermenting colonies appeared yellow on CLED agar, while non-lactose fermenting colonies appeared blue. E. coli colony appeared as large, elevated yellow opaque with intensely yellow center, CONS colony appeared pale yellow to white colonies, more opaque than Enterococci, S. aureus colony appeared as yellow colony of about 0.75 mm diameter, Enterococcus colony appeared as yellow colony of about 0.5 mm in diameter. Zone of inhibitions of every antibiotic was measured. The antibiotic/s to which isolated bacterial colony showed maximum sensitivity was noted.

Data Analysis

Data was entered and analyzed using SPSS-25. Descriptive statistics were applied to calculate mean and standard deviation for the age, height and weight of the patients. Frequencies and percentages were calculated for categorical variables (gender and co-morbid conditions). Effect modifiers such as age, gender, diabetes and hypertension were controlled by stratification. Post stratification chi-square test was applied. P-value equal or less than 0.05 was considered as significance.

RESULTS

A total of 150 cases fulfilling the selection criteria were enrolled to find out frequency of type of bacteria and antibiotic sensitivity in admitted patients of urinary tract infections. Age distribution shows that 92 patients (61.3%) were between 18-50 years of age whereas 58 (38.7%) cases were between 51-65 years of age. Mean age was calculated as 42.62+12.29 years. Gender distribution shows that 31(20.7%) cases were male whereas 119(79.3%) were females. Frequency of diabetes mellitus showed

that 64(42.7%) patients were diabetic whereas 86(57.3%) cases were non diabetics. Frequency of type of bacteria and corresponding sensitivity was documented. (Table-I)

DISCUSSION

Urinary tract infection (UTI) is the second most prevalent bacterial infection worldwide and a serious public health problem for people of all ages. About 95% of urinary tract infections are caused by bacteria. Uropathogens are becoming more resistant to antimicrobials, which might have negative consequences for the effectiveness of therapy for UTIs [7].Urinary tract infections become more challenging to treat in presence of comorbid conditions like diabetes, resulting in development of various complications.[14]

The empirical therapy of UTIs requires knowledge of the microorganisms involved and antibiograms. The rationale of this study was to find out common bacterial causes of urinary tract infections in hospitalized patients, to know the sensitivity of antibiotics, in order to make more effective empirical therapy to treat urinary tract infections without increasing antibiotic sensitivity and excessive use of undesired antibiotics.

In our study, 92(61.3%) patients were between 18-50 years of age whereas 58(38.7%) cases were between 51-65 years of age, mean age was calculated as 42.62+12.29 years. Gender distribution shows that 31(20.7%) cases were male whereas 119(79.3%) were females. Frequency of diabetes mellitus showed that 64(42.7%) patients were diabetic whereas 86(57.3%) cases were non diabetics. Frequency of type of bacteria showed E.coli in 65(43.3%) patients, Coagulase Negative Staphylococci (CONS) in 70(46.7%) patients, Enterococcus in 6(4%) and S.Aureus in 9(6%) of the cases.

Antibiotic	Nitrofurantoin	Ciprofloxacin	Cefotaxime	Vancomycin
E. coli	61(93.8%)	59 (90.8%)	59 (90.8%)	61 (93.8%)
Coagulase Negative Staphylococci (CONS)	67(95.7%)	66 (94.3%)	62 (88.6%)	65 (92.9%)
Enterococci	4(66.7%)	5 (83.3%)	5 (83.3%)	5 (83.3%)
S. aureus	7(77.8%)	8 (88.9%)	7 (77.8%)	8 (88.9%)

Table-I. Frequency of antibiotic sensitivity in admitted patients of urinary tract infections (n=150)

	Types of Bacteria				Total	P-Value
Age (Years)	E. coli	CONS	Enterococci	S. aureus		
18-50	44 (47.8%)	43 (46.7%)	0	5 (5.4%)	92	0.013
51-65	21 (36.2%)	27 (46.6%)	6 (10.3%)	4 (6.9%)	58	

Table-II. Frequency of type of bacteria by age (n=150)

	Types of Bacteria				Total	P-Value
Gender	E. coli	CONS	Enterococci	S. aureus		
Male	16 (51.6%)	11 (35.5%)	3 (9.7%)	1 (3.2%)	31	0.150
Female	49 (41.2%)	59 (49.6%)	3 (2.5%)	8 (6.7%)	119	

Table-III. Frequency of type of bacteria by gender (n=150)

	Types of Bacteria				Total	P-Value
Diabetes	E. coli	CONS	Enterococci	S. aureus		
Yes	27 (42.2%)	29 (45.3%)	4 (6.3%)	4 (6.3%)	64	0.682
No	38 (44.2%)	41 (47.7%)	2 (2.3%)	5 (5.8%)	86	

Table-IV. Frequency of type of bacteria by DM (n=150)

Frequency of sensitivity of antibiotic sensitivity showed sensitivity to Nitrofurantoin in 61 (93.8%) cases of E.coli, to Ciprofloxacin in 59 (90.8%) cases, to Cefotaxime in 59(90.8%) cases and to vancomycin in 61(93.8%) cases of E.Coli, whereas Coagulase Negative Staphylococci(CONS) showed sensitivity to Nitrofurantoin in 67(95.7%) patients, to Ciprofloxacin in 66(94.3%) patients, to Cefotaxime 62(88.6%) cases and to vancomycin in 65(92.9%) patients. Enterococci showed sensitivity to Nitrofurantoin in 94.3% patients, to Ciprofloxacin in 83.3% patients, to Cefotaxime in 83.3% cases and to vancomycin in 83.3% patients. S. Aureus showed sensitivity to Nitrofurantoin in 7(77.8%) patients, to Ciprofloxacin in 8(88.9%) patients, to Cefotaxime in 7(77.8%) patients and to vancomycin in 8(88.9%) cases. In one study, E. coli was found in 35.1% cases of UTI, Coagulase negative staphylococci (CONS) was found in 18.9% cases, Enterococcus was found in 16.2% cases and S. aureus was found in 10.8% cases.

In the same study, E. coli showed sensitivity to Nitrofurantoin and ciprofloxacin in 100% cases, CONS showed sensitivity to Cefotaxime and nitrofurantoin in 85.7% cases, Enterococci showed sensitivity to Ciprofloxacin in 100% cases and to vancomycin in 83.3% cases while S.aureus showed sensitivity to vancomycin in 82.2 % cases. The findings of our study are close to these studies.

CONCLUSION

We concluded that Coagulase Negative Staphylococci (CONS) and E.Coli as the leading type of bacteria found UTI whereas Nitrofurantoin, Ciprofloxacin, Cefotaxime and Vancomycin are highly sensitive for these pathogens.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Muhammad Awais Javed:** Data analysis.
2	**Fasiha Tahir:** Statistical work.
3	**Muhammad Sheraz Javed:** Study design.
4	**Saba Gulnaz:** Data collection.
5	**Khurrum Rehman:** Writing.