ORIGINAL RESEARCH

Fosfomycin sensitivity pattern against urinary tract infection pathogens

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Received: 20 December, 2020 Accepted: 24 January, 2021

ABSTRACT

Background: Among the most widespread ailments in humans are UTIs. Fosfomycin is one such drug that is once again being used to treat UTIs in the United Kingdom (UK).The present study was conducted to assess sensitivity pattern of fosfomycin against UTI pathogens. **Materials & Methods:** 74 patients with urinary tract infection (UTI) of both genders were selected. All patients had midstream clean catch urine samples taken in a sterile urine container. Every urine sample was semi-quantitatively plated on CLED agar and left to incubate overnight at 37°C. Tests for antibiotic susceptibility were performed on the notable increases in harmful microorganisms. The Kirby-Bauer disc diffusion test was performed using a 200 µg disc of fosfomycin. **Results:** Out of 74 patients, 34 were males and 40 were females. Organism isolated were E. coli in 58, Enterococcus spp. in 6, Klebsiella spp. in 3, Pseudomonas spp. in 3, Enterobacter spp. in 2, and Acinetobacter spp. in 1 and Proteus spp.in 1 case. E. coli showed maximum susceptibility against FOS (48) followed by NIT (37). Enterococcus spp. showed maximum susceptibility against FOS (9) followed by CZ (6). Klebsiella spp. showed maximum susceptibility against FOS (3), and FQ (3). Proteus spp. showed maximum susceptibility against FOS (2). Pseudomonas spp. showed maximum susceptibility against FOS (3), and Acinetobacter spp. showed maximum susceptibility againstshowed maximum susceptibility against NIT (2), and CZ (2). **Conclusion:** As part of a patient's empirical treatment arsenal for UTIs, fosfomycin trometamol should be used in conjunction with nitrofurantoin due to its low MIC distribution and high susceptibility.

Keywords: Fosfomycin, susceptibility, urinary tract infection

INTRODUCTION

Among the most widespread ailments in humans are UTIs. 50% of women will get a UTI at some point in their life, and 25% of women will experience recurrent infections. UTIs are among the most common human ailments, and as such, they contribute significantly to the usage of antibiotics, which in turn leads to antibiotic resistance. There are few available treatments for multidrug-resistant (MDR) bacteria, which are increasingly the cause of urinary tract infections. Given that a number of older drugs, like temocillin, mecillinam, fusidic acid, polymyxins, etc., have demonstrated potential efficacy against MDR microbes, reevaluating "neglected" antibacterial treatments is one tactic for tackling this complicated disease burden.

Fosfomycin is one such drug that is once again being used to treat UTIs in the United Kingdom (UK). A wide range of Gram-positive and Gram-negative bacteria can be effectively combatted by fosfomycin trometamol, which is also a well-tolerated drug. It is low in toxicity and acts as a time-dependent inhibitor of the MurA enzyme, which catalyzes the first committed step in the synthesis of peptidoglycans by phosphoenolpyruvate synthetase. Since this area of the nation lacks data on the MIC and susceptibility pattern of Fosfomycin.The present study was conducted to assess sensitivity pattern of fosfomycin against UTI pathogens.

MATERIALS & METHODS

The present study was conducted on74 patients with urinary tract infection (UTI) of both genders.All were

informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. A thorough physical and clinical examination was carried out. All patients had midstream clean catch urine samples taken in a sterile urine container. Every urine sample was semi-quantitatively plated on CLED agar and left to incubate overnight at 37°C. Tests for antibiotic susceptibility were performed on the notable increases in harmful microorganisms. The Kirby-Bauer disc diffusion test was performed using a 200 µg disc of fosfomycin. Using the agar dilution method, the MIC for fosfomycin trometamol was ascertained in accordance with the criteria of the Clinical and Laboratory Standards Institute (CLSI). Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 74		
Gender	**Male**	**Female**
Number	34	40

Table I shows that out of 74 patients, 34 were males and 40 were females.

Table II UTI pathogens isolated

UTI pathogens	Number	P value
E. coli	58	0.01
Enterococcus spp.	6	
Klebsiella spp.	3	
Pseudomonas spp.	3	
Enterobacter spp.	2	
Acinetobacter spp.	1	
Proteus spp.	1	

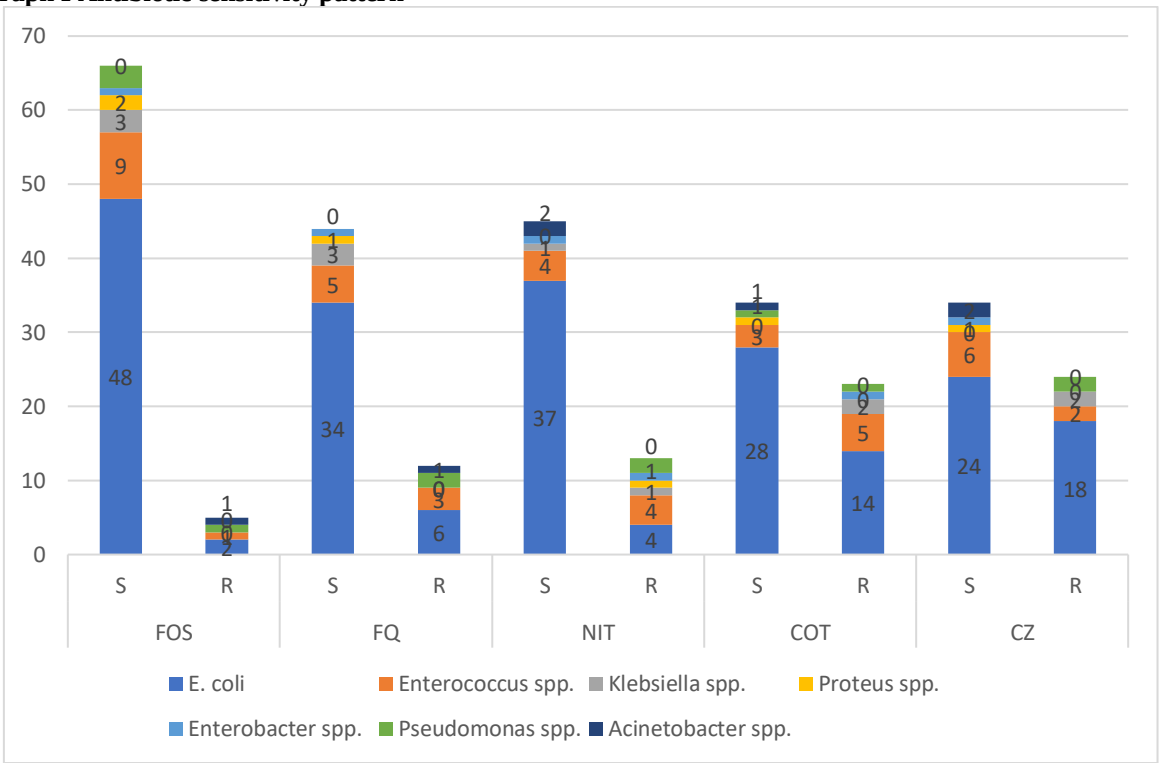
Table II shows that organism isolated were E. coli in 58, Enterococcus spp. in 6, Klebsiella spp. in 3, Pseudomonas spp. in 3, Enterobacter spp. in 2, and Acinetobacter spp. in 1and Proteus spp.in 1case. The difference was significant (P< 0.05).

Table III Antibiotic sensitivity pattern

Organism	FOS		FQ		NIT		COT		CZ	
	S	**R**	**S**	**R**	**S**	**R**	**S**	**R**	**S**	**R**
E. coli	48	2	34	6	37	4	28	14	24	18
Enterococcus spp.	9	1	5	3	4	4	3	5	6	2
Klebsiella spp.	3	0	3	0	1	1	0	2	0	2
Proteus spp.	2	0	1	0	0	1	1	0	1	0
Enterobacter spp.	1	0	1	0	1	1	0	1	1	0
Pseudomonas spp.	3	1	0	2	0	2	1	1	0	2
Acinetobacter spp.	0	1	0	1	2	0	1	0	2	0

Table III, graph I shows that E. coli showed maximum susceptibility against FOS (48) followed by NIT (37). Enterococcus spp. showed maximum susceptibility against FOS (9) followed by CZ (6). Klebsiella spp. showed maximum susceptibility against FOS (3), and FQ (3). Proteus spp. showed maximum susceptibility against FOS (2). Pseudomonas spp. showed maximum susceptibility against FOS (3), and Acinetobacter spp. showed maximum susceptibility againstshowed maximum susceptibility against NIT (2), and CZ (2).

Graph I Antibiotic sensitivity pattern



DISCUSSION

One of the most typical bacterial infections and the second most prevalent infectious disease in clinics and hospitals is urinary tract infections, or UTIs. Urinary tract infections (UTIs) are inflammatory disorders caused by microorganisms that have proliferated abnormally in the urinary system. UTIs are known to induce short-term morbidities such as fever, dysuria, lower abdominal pain, and may result in permanent kidney scarring. UTIs are either community-acquired or hospital-acquired (HA). Infection of the urinary system originates in individuals either in the community (within 48 h of admission) or a hospital setting. The present study was conducted to assess sensitivity pattern of fosfomycin against UTI pathogens.

We found that out of 74 patients, 34 were males and 40 were females.Ghaima et al included 1140 pregnant women. The disc diffusion test was used to determine the antimicrobial resistance patterns of the isolated bacteria. The present study revealed that three hundred and fifty- six isolates were positive for significant bacterial growth. *Escherichia coli* were the predominant bacteria (34 %) followed by *Staphylococcus aureus* (22.2%), *Klebsiella* spp.(14.6%),noncoagulase *Staphylococcus* (11.5%), *Proteus* spp.(4.5%), *Pseudo monas* spp.(3.7%), *Acinetobacter* spp.(2.8%), *Citroba cter* (2.8%), *Enterococcus* (2.5%) and *Enterobacter* (1.4 %). High resistance to Ampicillin (85.6 %), Co-trimoxazole (72.2 %) and Tetracycline (71.3 %) was observed. Also, It was found a moderate resistance to Ceftazidime, Ciprofloxacin, Amoxicillin-clavulanic acid and Ceftriaxone. Imipenem was the most active antibiotic against isolated uropathogens. Among the 356 uropathogenic isolates, 196 (55 %) were from women in the 21 to 30 years old age group, and this rate was higher than other age groups.

We found that organism isolated were E. coli in 58, Enterococcus spp. in 6, Klebsiella spp. in 3, Pseudomonas spp. in 3, Enterobacter spp. in 2, and Acinetobacter spp. in 1 and Proteus spp.in 1 case. Mandal et al reported the current antibiotic resistance pattern among common bacterial uropathogens isolated in a tertiary care hospital. A total of 19,050 consecutive urine samples were cultured and pathogens isolated were identified by standard methods. Antibiotic susceptibility was done by Kirby Bauer disk diffusion method. The clinical and demographic profile of the patients was noted.Of the 19,050 samples, 62 per cent were sterile, 26.01 per cent showed significant growth, 2.3 per cent showed insignificant growth and 9.6 per cent were found contaminated. Significant association (P<0.001) of prior use of antibiotics in males, UTI in adults, gynaecological surgery in females, obstructive uropathy in males and complicated UTI in females with the occurrence of UTI with ciprofloxacin resistant Escherichia coli was noted. Significant association was noted in females with prior antibiotics, with prior urological surgery and in males with prior complicated UTI. There was no significant association with diabetes mellitus with the occurrence of UTI with ciprofloxacin resistant E. coli. Fluoroquinolone resistance was found to increase with age.

We found that E. coli showed maximum susceptibility against FOS (48) followed by NIT (37). Enterococcus spp. showed maximum susceptibility against FOS (9) followed by CZ (6). Klebsiella spp. showed maximum susceptibility against FOS (3), and FQ (3). Proteus spp. showed maximum susceptibility against FOS (2). Pseudomonas spp. showed maximum susceptibility against FOS (3), and Acinetobacter spp. showed maximum susceptibility againstshowed maximum susceptibility against NIT (2), and CZ (2). Badhan et al evaluated the bacteriological profile and antibiotic sensitivity patterns in children with UTI prospectively from a tertiary care center.A total of 800 children up to 18 years of age with suspected UTI attending our center were included. For all suspected cases urine microscopy, gram staining, and culture were done. Antibiotic sensitivity was performed on selected antimicrobials using disk diffusion method following Clinical Laboratory Standards Institute guidelines.Majority of pathogens were isolated from female (54.2%) patients. Pre-teens (52.1%) and teens (27.1%) were most commonly affected age group. The most common presentation in culture-proven UTI was fever with urinary symptoms (33.3%). In a group of 192 patients 26.7% had proven UTI. *Escherichia coli* (42.3%) was the most common aetiological agent, followed by *Enterococcus fecalis* (13.5%), *Klebsiella* spp. (11.5%) and *Staphylococcus aureus* (11.5%). Most active antibiotics against Gram-negative isolates were nitrofurantoin, cefotaxime, and amikacin. Gram-positive isolates were sensitive to nitrofurantoin, cotrimoxazole, and novobiocin.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that as part of a patient's empirical treatment arsenal for UTIs, fosfomycin trometamol should be used in conjunction with nitrofurantoin due to its low MIC distribution and high susceptibility.

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