

# Effectiveness of a Single Fosfomycin Dosage Compared to a Five-Day Ciprofloxacin Course in patients with simple Urinary Tract Infection

SHABANA MOHAMMAD ALI

Department of Family Medicine, Tawam Hospital, Alain-AbuDhabi.

Correspondence to Dr. Shabana Mohammad Ali, Email: [shabana\\_lanjar@hotmail.com](mailto:shabana_lanjar@hotmail.com) +971501361789.

## ABSTRACT

**Background:** Treating simple diseases like uncomplicated urinary tract infection (UTIs) have become a challenge for physicians due to multi- drug resistance and genetic variations globally as well as in our local population.

**Aim:** To determine the effectiveness of a single fosfomycin (3g) dose in comparison to a 05 days ciprofloxacin (1g) dose among patients suffering from uncomplicated urinary tract infection.

**Methods:** This was randomized controlled trial (RCT) with 128 patients enrolled and divided into two groups. Group A received fosfomycin 3mg for 1 day, and group B received ciprofloxacin 1g for 5 days. The data was analyzed in SPSS 25 Version.

**Results:** Patients in group A had an average age of 43.5±9.4 years, while those in group B had an average age of 46.2 ± 7.9. With a statistically significant p-value of 0.028, fosfomycin group A exhibits substantially better efficacy, i.e., 87.5%, than ciprofloxacin group B, i.e., 71.9%. The study compared Fosfomycin and Ciprofloxacin's efficacy across age groups, marital statuses, and symptoms durations. Fosfomycin was found to be more effective in patients aged 20-40 and married, but not in those aged 40-60, unmarried, or with longer symptoms.

**Practical Implication:** Short duration of medicine, and more effectiveness in treating patients make it better choice for treating UTIs.

**Conclusion:** The outcomes of the Fosfomycin treatment were comparable to those of the ciprofloxacin treatment, even though it was only a single dose course and had better compliance.

**Keywords:** Urinary tract infection, Fosfomycin, ciprofloxacin

## INTRODUCTION

Treating simple diseases like uncomplicated UTIs has become a challenge for physicians due to multi-drug resistance and genetic variations globally as well as in our local population<sup>1</sup>. An infection of the bladder and related tissues is a lower UTI, and an illness caused by common microorganisms in individuals with normal kidney and urinary tract function and no underlying comorbidities is referred to as an uncomplicated UTI. The most prevalent reason for community antibiotic usage is uncomplicated UTIs. Conversely, the drug-resistant gramme-positive bacteria that can cause infections are becoming more prevalent<sup>2</sup>.

Two historic medications, nitrofurantoin and fosfomycin, can still affect a large number of germs that are resistant to several drugs. They have an advantage over more recent drugs due to their low toxicity and high urine concentrations. People having uncomplicated UTIs due to multi-resistant pathogens may get cured by fosfomycin, as reported by a previous study<sup>3</sup>.

There is a paucity of clinical evidence; however, fosfomycin has demonstrated potential in vitro against multidrug-resistant urinary infections<sup>4</sup>. Oral fosfomycin is generally well tolerated and has little side effects. Diarrhoea is the most common adverse effect reported by just 5% of people<sup>5</sup>.

Simple UTIs are the most typical type of pathogenic infections in the community. Lately, ciprofloxacin has emerged as a useful therapeutic choice. Yet, the effectiveness of the current dose schedules has been called into doubt due to the growth of ciprofloxacin resistance<sup>6</sup>.

For those with acute or severe urinary tract infections, ciprofloxacin is a safe and efficient therapeutic choice<sup>7</sup>. According to one trial, 58% of patients received a single dosage of fosfomycin that was effective<sup>8</sup>, although 89% of patients had a five-day treatment of ciprofloxacin with effectiveness<sup>9</sup>.

However, one study indicated that for simple UTIs, ciprofloxacin was 94% effective and single-dose fosfomycin was 96% effective ( $p > 0.05$ )<sup>10</sup>. However, previous research has demonstrated that ciprofloxacin was superior to fosfomycin in terms of helping people get well, but now high resistance to ciprofloxacin has been reported<sup>10,11</sup>.

The purpose of this research is to determine the effectiveness of a single fosfomycin (3g) dose in comparison to a 5-day ciprofloxacin (1g) dose among patients suffering from uncomplicated urinary tract infection.

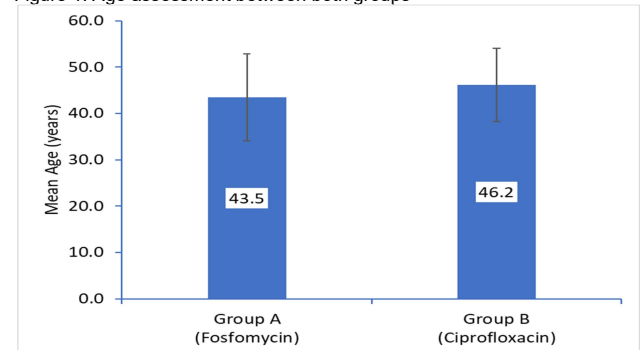
## METHODOLOGY

This randomized, controlled experiment was conducted in Jinnah Hospital Lahore with ethical approval. The 128 female patients, ranging in age from 20 to 60, who presented with a simple urinary tract infection were included in the study. Baseline data of all enrolled patients was collected in a specialized proforma designed for the study, followed by written concern. Group-A (n=64) received fosfomycin 3g as a single dose, while group B (n=64) received ciprofloxacin 1g for 5 days. Patients having co-morbidities like diabetes ( $>200\text{mg/dL}$ ), hypertension ( $\geq 160/110\text{mmHg}$ ), hepatic/renal dysfunction (creatinine  $>1.2\text{ mg/dL}$ ), recurrent UTIs, were excluded from the study.

## RESULTS

Patients in group A had an average age of 43.5±9.4 years, while those in group B had an average age of 46.2±7.9 as depicted in Figure-1.

Figure 1: Age assessment between both groups



Mean duration of symptoms showed insignificant difference between both groups ( $p\text{-value} = 0.142$ ) as shown in Figure-2.

Received on 12-12-2023

Accepted on 19-02-2024

Figure 2: Comparison of the two groups' symptom durations

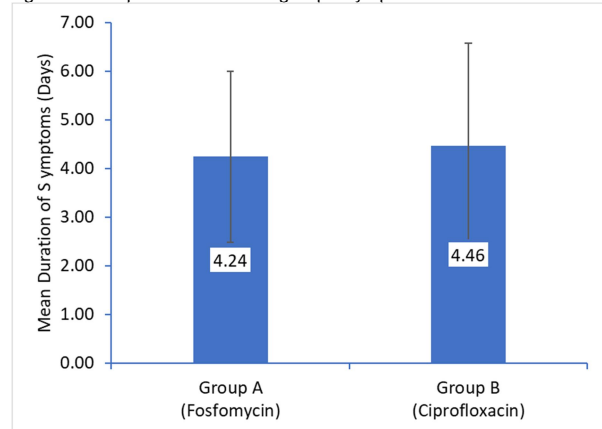


Table-1: Marital status among participants

Group	Married	Unmarried	P value
Group A (Fosfomycin)	54 (84.4%)	10 (15.6%)	0.811
Group B (Ciprofloxacin)	53 (82.8%)	11 (17.2%)	

Table-2: Comparison of efficacy of treatment between groups

Efficacy of treatment	Group A	Group B	P value
Effective	56 (87.5%)	46 (71.9%)	0.028*
Not Effective	8 (12.5%)	18 (28.1%)	

\*Significant

There were 54(84.4%) married females in group A and 53 (82.8%) married females in group B as depicted in Table-1

Table-3: Efficacy of treatment comparison among both groups through stratification

Variables	Categories	Group A		Group B		p-value
		Effective (n=56)	Not Effective (n=8)	Effective (n=46)	Not Effective (n=18)	
Age (years)	20-40	18 (90.0%)	2 (10.0%)	16 (61.5%)	10 (38.5%)	0.029*
	40-60	38 (86.4%)	6 (13.6%)	30 (78.9%)	8 (21.1%)	0.373
Marital status	Married	48 (90.6%)	5 (9.4%)	40 (74.1%)	14 (25.9%)	0.026*
	Unmarried	6 (66.7%)	3 (33.3%)	6 (60.0%)	4 (40.0%)	0.999
Duration of symptoms (days)	≤ 5	32 (88.9%)	4 (11.1%)	30 (73.2%)	11 (26.8%)	0.082*
	> 5	14 (77.8%)	4 (22.2%)	16 (69.6%)	7 (30.4%)	0.726

\*Significant

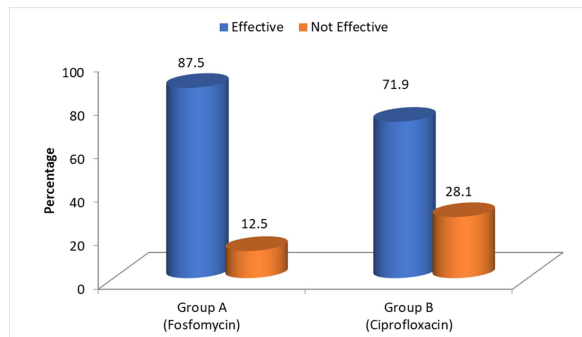
## DISCUSSION

The most common diseases in humans are urinary tract infections (UTIs).<sup>11</sup> According to estimates, 25% of women will experience recurrent UTIs, and at least one UTI will occur in the lifespan of 50% of all women. Maladkar and Revandkar, in their investigation, found that there was no significant difference in the cure rates (83.0-80.0%) between fosfomycin and ciprofloxacin treatment. Our study's results are similar in that there was no discernible relationship between study groups and efficacy.<sup>12</sup> It has been discovered that 58–66% of *E. coli* has ciprofloxacin resistance, according to recent studies<sup>13</sup>. According to Turkish studies<sup>14</sup>, one significant differentiating element in the context of resistance patterns has been the use of ciprofloxacin alone in the last six months or a year. The most commonly used medication for treating kidney infections empirically is a fluoroquinolone, which is prescribed in 77.0% of cases<sup>15</sup>.

The therapeutic response for fosfomycin was found to be 66.0%, which is very close to the results of our trial, where the fosfomycin success rate was 63.3%<sup>16</sup>. In the above-mentioned study, patients with co-morbidities along with repeated antibiotic exposure were treated with fosfomycin (3g) for alternate 2 days<sup>16</sup>. Thus, the present study was in line with the above-mentioned study. We discovered that there was no statistically significant difference (p=0.05) between our investigation's and another study's bacterial treatment rates for fosfomycin and ciprofloxacin<sup>17</sup>.

Fosfomycin (Group A) shows significantly higher efficacy (87.5%) compared to Ciprofloxacin (Group B) (71.9%), as shown in Table-2.

Figure 3: Comparison of efficacy of treatment between groups



Results in Table-3 compare the efficacy of Fosfomycin (Group A) and Ciprofloxacin (Group B) across different age groups, marital statuses, and durations of symptoms. The outcomes show that Fosfomycin is more effective than Ciprofloxacin in patients aged 20-40 (90% vs 61.5%, p=0.029) and in married individuals (90.6% vs 74.1%, p=0.026). However, there are no significant differences in efficacy between the two groups for patients aged 40-60, unmarried individuals, or those with symptom durations of ≤ 5 days or >5 days. These findings suggest that Fosfomycin may be a more suitable treatment option for younger, married patients.

This study might have certain possible shortcomings. To begin with, no prior local trial investigations were conducted on this subject. Accurate information about local culture and sensibilities was therefore very difficult to come by. This is a significant information vacuum that offers a chance for additional research and advancement in the sector. The second minor limitation was that the project did not have enough funding, so the available resources were used without asking for the need to run cultures and sensitivities when treating the patients.

**Limitations:** Limitations included small study duration, no genetic workup, singlecentre study with limited financial resources.

## CONCLUSION

It was concluded that a single dose of fosfomycin was as effective and tolerable in comparison to five-days course of ciprofloxacin in treating simple UTIs. Hence it is recommended to treat uncomplicated UTIs with fosfomycin in our clinical setup.

### Author's contribution:

SMA: Overall supervision, write-up and literature review.

**Acknowledgement:** Thanks to Allah who made it possible.

**Funding:** Nil

**Conflict of interest:** Nothing to declare

## REFERENCES

1. Urinary tract infection syndromes: occurrence, recurrence, bacteriology, risk factors, and disease burden. Foxman B. *Infect Dis Clin North Am.* 2014;28:1–13. [PubMed] [Google Scholar]
2. Clinical management of an increasing threat: outpatient urinary tract infections due to multidrug-resistant uropathogens. Walker E, Lyman A, Gupta K, Mahoney MV, Snyder GM, Hirsch EB. *Clin Infect Dis.* 2016;63:960–965. [PubMed] [Google Scholar]
3. Nitrofurantoin and fosfomycin for resistant urinary tract infections: old drugs for emerging problems. Gardiner BJ, Stewardson AJ, Abbott IJ, Peleg AY. *AustPrescr.* 2019;42:14–19. [PMC free article] [PubMed] [Google Scholar]
4. Fosfomycin. Falagas ME, Vouloumanou EK, Samonis G, Vardakas KZ. *ClinMicrobiol Rev.* 2016;29:321–347. [PMC free article] [PubMed] [Google Scholar]
5. Oral fosfomycin for treatment of urinary tract infection: a retrospective cohort study. Matthews PC, Barrett LK, Warren S, Stoesser N, Snelling M, Scarborough M, Jones N. *BMC Infect Dis.* 2016;16 [PMC free article] [PubMed] [Google Scholar]
6. Dosing of ciprofloxacin in uncomplicated urinary tract infections. Tomić Z, Tomas A, Sabo A., et al. *ClinTher.* 2015;37:137–138. [Google Scholar]
7. Efficacy and safety of ciprofloxacin treatment in urinary tract infections (UTIs) in adults: a systematic review with meta-analysis. [Article in Spanish] Gutiérrez-Castrellón P, Díaz-García L, de Colsa-Ranero A, Cuevas-Alpuche J, Jiménez-Escobar I. [https://www.anmm.org.mx/GMM/2015/n2\\_english/2331AX152\\_151\\_2015\\_UK2\\_210-228.pdf](https://www.anmm.org.mx/GMM/2015/n2_english/2331AX152_151_2015_UK2_210-228.pdf). *Gac Med Mex.* 2015;151:225–244. [PubMed] [Google Scholar]
8. Effect of 5-day nitrofurantoin vs single-dose fosfomycin on clinical resolution of uncomplicated lower urinary tract infection in women: a randomized clinical trial. Huttner A, Kowalczyk A, Turjeman A, et al. *JAMA.* 2018;319:1781–1789. [PMC free article] [PubMed] [Google Scholar]
9. Short-course ciproflox treatment of acute uncomplicated urinary tract infection in women: the minimum effective dose. Iravani A, Tice AD, McCarty J, et al. *Arch Intern Med.* 1995;155:485–494. [PubMed] [Google Scholar]
10. Comparison efficacy of single dose fosfomycin with ciprofloxacin in the treatment of urinary tract infection in symptomatic women. Bozkurt OF, Kara Cengiz, Akarsu S, Çağlar M, Unsal A. [https://www.researchgate.net/publication/288129919\\_Comparison\\_efficiency\\_of\\_single\\_dose\\_fosfomycin\\_with\\_ciprofloxacin\\_in\\_the\\_treatment\\_of\\_urinary\\_tract\\_infection\\_in\\_symptomatic\\_women](https://www.researchgate.net/publication/288129919_Comparison_efficiency_of_single_dose_fosfomycin_with_ciprofloxacin_in_the_treatment_of_urinary_tract_infection_in_symptomatic_women) *Turk J Urol.* 2008;34:360–362. [Google Scholar]
11. Increasing antimicrobial resistance among uropathogens: is fosfomycin the answer? Sultan A, Rizvi M, Khan F, Sami H, Shukla I, Khan HM. *Urol Ann.* 2015;7:26–30. [PMC free article] [PubMed] [Google Scholar]
12. Laboratory diagnosis of urinary tract infections: guidelines, challenges, and innovations. Pezzlo M. *ClinMicrobiolNews.* 2014;36:87–93. [Google Scholar]
13. Fosfomycin, single-dose oral antibiotic for uncomplicated UTI-a review. Maladkar M, Revandkar V. <https://articles.theindianpractitioner.com/index.php/tip/article/view/22> *Indian Pract.* 2019;72:34–41. [Google Scholar]
14. Prevalence and antimicrobial susceptibility of *Escherichia coli* in outpatient isolates in Izmir, Turkey. Yilmaz N, Agus N, Yurtsever SG, et al. <https://www.medsimonit.com/abstract/index/idArt/878224> *Med SciMonit.* 2009;15:161–165. [PubMed] [Google Scholar]
15. Prevalence and risk factors for selection of quinolone-resistant *Escherichia coli* strains in fecal flora of patients receiving quinolone therapy. Yagci D, Yoruk F, Azap A, Memikoglu O. *Antimicrob Agents Chemother.* 2009;53:1287–1289. [PMC free article] [PubMed] [Google Scholar]
16. Prevalence and antibiotic resistance pattern of urinary tract bacterial infections in Dessie area, North-East Ethiopia. Abejew AA, Denboba AA, Mekonnen AG. *BMC Res Notes.* 2014;7 [PMC free article] [PubMed] [Google Scholar]
17. Multiple-dose oral fosfomycin for treatment of complicated urinary tract infections in the outpatient setting. Derington CG, Benavides N, Delate T, Fish DN. *Open Forum Infect Dis.* 2020;7 [PMC free article] [PubMed] [Google Scholar]

**This article may be cited as:** Ali SM: Effectiveness of a Single Fosfomycin Dosage Compared to a Five-Day Ciprofloxacin Course in patients with simple Urinary Tract Infection. *Pak J Med Health Sci,* 2024; 18(3):37-39.