2018

www.jmscr.igmpublication.org Impact Factor (SJIF): 6.379 Index Copernicus Value: 71.58 ISSN (e)-2347-176x ISSN (p) 2455-0450 crossrefDOI: https://dx.doi.org/10.18535/jmscr/v6i6.70



Journal Of Medical Science And Clinical Research An Official Publication Of IGM Publication

Original Article

Fosfomycin: Current Scenario and Susceptibility Pattern in Urinary Isolates of a Teaching Hospital

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Abstract

The increasing resistance among Gram Negative organisms has demanded the implementation of alternative treatment strategies. With no other options in the near future we are re-evaluating the older antibiotics which at that point of time were discontinued because of the associated side effects. This study was undertaken to know the susceptibility pattern of urinary isolates in our hospital.

Material and Methods: This study was done on all the urinary isolates obtained from January 2017 to June 2017. Samples were processed and interpretated as per CLSI guideline. The isolates included for this study are, E coli, Klebsiella sp and Pseudomonas sp.

Results: A total of 230 significant isolates were obtained from 1732 urine samples. The most common isolate obtained was E coli with a sensitivity of 85%. Isolates obtained from admitted patients had lesser sensitivity.

Conclusion: This study shows that fosfomycin could be used as an alternative treatment modality. Combination therapy if used can help in reducing development of resistance.

Keywords: Multi drug resistance organisms, fosfomycin, Urinary Tract infection.

Introduction

With the emerging resistance, growing Multi drug resistance organisms (MDRO) and dearth of new antimicrobials we are compelled to reconsider and rethink over the use of old antibiotics which at that time were not used because of the linked side effects. fosfomycin is the drug which has a promising role and has emerged as a good therapeutic agent against Methicillin Resistant *Staphylococcus aureus*, Vancomycin resistant Enterococci and other multidrug resistant Gram

bacteria.^[1,2,3,4] negative Fosfomycin is а phosphonic acid derivative, which inhibits peptidoglycan layer formation at the very beginning before the action of beta lactums, synthesis.^[2] thereby disrupting cell wall fosfomycin has been approved by the Food and Drug Administration (FDA) for the treatment of uncomplicated urinary tract infection (UTI) in adult women that is caused by Escherichia coli and Enterococcus faecalis.^[3] Studies have revealed that it can also be used for a variety of infections

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including meningitis, infections of bone, soft tissue infections ,sepsis, pneumonia, and pyelonephritis.^[5-9]

Fosfomycinis a bactericidal, broad spectrum antibiotic.^[10] it does not undergo hepatic metabolism, and is primarily eliminated as unchanged the kidneys through drug by glomerular filtration. About 90% of the administered dose is eliminated in the kidneys.^[11] Oral bioavailability of the drug is <50%.^[12]

This study was undertaken to know the susceptibility pattern of the isolates to fosfomycin in urinary tract infection (UTI) so that it can be used an alternative agent in cases of UTI.

Material and Methods

This study was done on all the isolates obtained from urine sample from January 2017 to June 2017. Clinical samples were processed as per CLSI guideline using cysteinlysine electrolyte deficient (CLED) agar. Clinical isolates were further tested for identification & susceptibility testing by manual methods. Manual sensitivity was performed on Mueller Hinton Agar (BD) using antibiotic discs (BD). CLSI M-100-S23 was followed for susceptibility testing. The isolates included for this study are, *E coli, Klebsiella* sp *and Pseudomonas* sp. Interpretation of biochemical tests and drug susceptibility were done as per recommended CLSI guidelines. According to which, fosfomycin disc with a clearing zone of >16mm was considered sensitive. A zone diameter of >12- 15mm was considered as intermittently sensitive and <12 mm as resistant.

Results

A total of 230 significant isolates were obtained from 1732 urine sample. All the isolates were categorized into outpatient department (OPD) and in patient department (IPD) sample for further evaluation. IPD included critical care areas, emergency and wards. It was found that 146 (63.47%) were IPD samples and 84 (36.52%) were OPD samples. Distribution of isolates according to their location has been shown in Fig 1 and Fig2.

Sensitivity of the above mentioned isolates has been shown in Fig. 3, Fig. 4, Fig. 5. The Figure also represents a comparative data on sensitivity pattern of both the locations.



Fig. 1 showing isolates obtained from IPD

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Fig. 2 showing isolates obtained from OPD



Fig 3 showing sensitivity pattern of *E coli* from OPD and IPD





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Fig 5 showing sensitivity pattern of *Pseudomonas* sp from OPD and IPD

Discussion

It is clear from the present study that drug fosfomycin has a good sensitivity against all the three isolates and can be used as a treatment option. OPD isolates show a better sensitivity when compared to IPD isolates. This can be attributed to constant exposure of IPD patients to antibiotics. Similiar to other studies ;E coli is the most common isolate in both the locations in urinary tract infection in this study followed by *Klebsiella* sp and *Pseudomonas*.^[13] The sensitivity to fosfomycin in *E coli* isolates was less when compared to other study 85% in OPD isolates and 79% in IPD isolates.^[14,15]

As CLSI does not mention the zone size for *Klebsiella* sp and *Pseudomonas* sp, values were interpreted with respect to CLSI interpretative criteria for *E. coli*. The sensitivity of *E coli* and *Klebsiella* sp was more when compared to study done by Zafar et al.^[13] Same study reports sensitivity of *Psudomonas* sp to 100% whereas in this study the sensitivity is 41-50%. Review literature suggest inherent and acquired resistant mechanism for *Pseudomonas* sp which could be responsible forits low sensitivity.^[16]

Resistance have also been noted during fosfomycin monotherapy specially in cases of pseudomonal infections. Literature suggest that

combination therapy is required for this pathogen.^[17,18]

The rate of resistance noted in this study is high (15-60%) when compared to other studies.^[19]

From this study we can conclude that fosfomycin can be a good alternative option to treatment but combination therapy is suggested to limit the development of resistance. Combination therapy should be chosen in cases with higher minimum inhibitory concentration values (MIC). More pharmacodynamic and clinical trial data are required to validate the suitability of the current breakpoints for a wider range of species than we have examined.

Conclusion

Fosfomycin is a broad spectrum antibiotic with fewer side effects. It could have an increased role in diseases other than UTI. Combination therapy is recommended for isolates specially in IPD patients to decrease the resistance development. More studies are still desired to know the pharmacodynamics of this drug.

Support: Nil Conflicts of Interest: None Permissions: Nil

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