



Nitrofurantoin in Urinary Tract Infection: Old is Gold

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ABSTRACT

Objective of the study was to find out the Resistogram of the urinary isolates against different commonly prescribed antimicrobials according to CLSI guidelines. Out of total 319 test samples, in 56 cases bacterial pathogens were isolated. Among those 56 isolates only 13 were resistant to Nitrofurantoin (23.21%) where as resistance to Ciprofloxacin was found in 40 isolates(71.42%), resistance against Co-Trimoxazole was found in 27 isolates (48.21%) and surprisingly, resistance against Carbapenem antibiotics (Meropenem) was in 20 isolates (35.71%). Majority of the Nitrofurantoin resistant bacterial isolates were *Klebsiella pneumoniae* (4 out of 13 i.e, 30.76%). All Nitrofurantoin resistant isolates were sensitive to both Tigecycline and Colistin and the isolated *Escherichia coli* (two in number) were sensitive to Meropenem also. There were no other therapeutic options like Fluroquinolones or Co-trimoxazole to manage the Nitrofurantoin resistant isolates as all of them were resistant to them. Thus medical community should think twice before replacing Nitrofurantoin with Fluroquinolones or Co-Trimoxazoles as emperical therapy.

Keywords: Emperical Therapy, Nitrofurantoin, Resistogram, Sensitive, UTI.

INTRODUCTION

Urinary tract infection (UTI) is one of the most common health problems in the community as well as in nosocomial set up¹⁻⁵. It is almost impossible to find out a clinician who has never attended & treated at least one case of UTI throughout his career. Nitrofurantoin is an age old drug to treat uncomplicated UTI⁶⁻⁹. The drug works

by damaging bacterial DNA, since its reduced form is highly reactive. Organisms are said to be susceptible to nitrofurantoin if their minimum inhibitory concentration (MIC) is 32µg/mL or less. The peak blood concentration of nitrofurantoin following an oral dose of 100 mg, is less than 1 µg/mL and may be undetectable; tissue penetration

is negligible; the drug is well concentrated in the urine. At the concentrations achieved in urine (>100 µg/mL), nitrofurantoin is bacteriocidal. It is bacteriostatic against most susceptible organisms at concentrations less than 32µg/mL¹⁰.

Nitrofurantoin and the quinolone antibiotics are mutually antagonistic *in vitro*. It is not known whether this is of clinical significance, but the combination should be avoided¹¹.

Now-a-days, different guidelines are giving emphasis on Fluroquinolones and Co-trimoxazole¹⁰⁻¹⁷. Again, Carbapenems inspite of being a parenteral option, are also prescribed by several schools. However, this study reveals the fact that bacterial isolates developed greater resistance against Fluroquinolones, Co-trimoxazole and Carbapenems more than Nitrofurantoin.

OBJECTIVE

Objective of the present study was to find out the sensitivity pattern of the urinary isolates against different commonly prescribed antimicrobials in uncomplicated UTI.

MATERIALS AND METHODS

The study was performed from January 2014 to February 2014 with 319 suspected patients with signs and symptoms of uncomplicated UTI. Urinary urgency, hesitancy, increased frequency of micturition, pyrexia and burning sensation during micturition were the symptoms to fulfill the inclusion criteria. Immunocompromised patients, patients with renal transplantation and any other co-morbidity were excluded from the study. Microbiological work up to isolate and identify the bacterial pathogen from mid stream urine collected in proper sterile manner was done as per standard protocol. Antibigram was done by Kirby-

Bauer disk diffusion technique according to CLSI guidelines.

RESULTS AND DISCUSSION

Out of total 319 test samples, in 56 cases bacterial pathogens were isolated. Among those 56 isolates only 13 were resistant to Nitrofurantoin (23.21%) where as resistance to Ciprofloxacin was in 40 isolates (71.42%), resistance against Co-Trimoxazole was in 27 isolates (48.21%) and surprisingly, resistance against Carbapenem antibiotics (Meropenem) was in 20 isolates (35.71%).

Majority of the Nitrofurantoin resistant bacterial isolates were *Klebsiella pneumoniae* (4 out of 13 i.e, 30.76%). Distribution of Nitrofurantoin resistant isolates are depicted in following Bar diagram.

See Fig. 1.

All Nitrofurantoin resistant isolates were sensitive to both Tigecycline and Colistin and the isolated *Escherichia coli* (two in number) were sensitive to Meropenem also. There were no other therapeutic options like Fluroquinolones or Co-trimoxazole to manage the Nitrofurantoin resistant isolates as all of them were resistant to them.

DISCUSSION

Nitrofurantoin is a cost effective oral drug with good patient compliance¹⁸⁻²⁰. Within its therapeutic range it has no grave adverse effect²¹⁻²⁴. The present study establishes the fact that majority of the organisms causing uncomplicated UTI are sensitive to it---be it a gram positive one or a gram negative one. Among 56 isolates only 13 were resistant to Nitrofurantoin (23.21%) where as resistance to Ciprofloxacin was in 40 isolates(71.42%), resistance against Co-Trimoxazole was in 27 isolates (48.21%) and surprisingly, resistance against Carbapenem antibiotics (Meropenem) was also high i.e, in 20 isolates (35.71%). These findings in our

antimicrobial resistogram corroborates with the work of Awari *et al*²⁵.

There is a scarcity of data in medical literature about the sensitivity of gram positive organisms to Nitrofurantoin. However in the study of Bhattacharyya *et al.* in Kolkata, no Nitrofurantoin resistant *Enterococcus* sp. was reported, two intermediately sensitive *Enterococcus* spp. were reported (determined by VITEK 2-AES system)²⁶. Similarly in this study, majority of the Nitrofurantoin resistant bacteria were gram negative (*Klebsiella pneumoniae* 30.76%) and only one gram positive bacteria (*Enterococcus* sp.) was found to be resistant.

CONCLUSION

Nitrofurantoin in spite of being an older option can be used in pregnancy especially in early trimesters whereas opinion about Cotrimoxazole and Ciprofloxacin are controversial. Thus medical community should think twice before totally replacing Nitrofurantoin with Fluoroquinolones or Co-Trimoxazole as empirical therapy.

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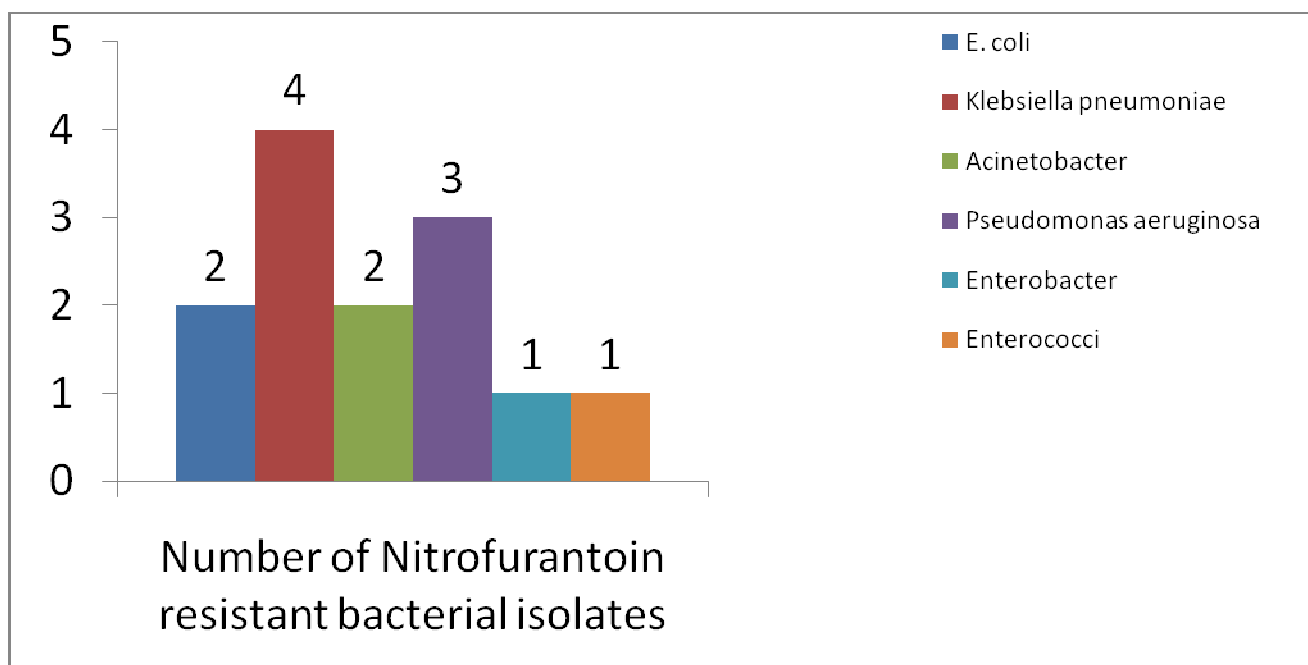


Fig. 1. Distribution of Nitrofurantoin resistant.