

Nitrofurantoin Resistance *E.coli* Isolated From Urinary Tract Infection

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Abstract

Nitrofurantoin is an Macrobid antibiotic, effective in treating Urinary Tract Infections (UTI) caused by bacteria, particularly in the treatment of *E. coli*. Trimethoprim/ sulfamethoxazole and Fluroquinolone resistant *E. coli* has led to increased interest in using Nitrofurantoin to cure rates of uncomplicated UTI. In this present study, urine samples suspected for UTI were collected from the different diagnostic laboratory from Hassan. Karnataka. 20 urine samples yielded *E. coli* were taken into the study. Resistance pattern of the *E. coli* were read against the antibiotics by Kirby Bauer technique revealed the presence of 75% Nitrofurantoin resistance strains. By this it is concluded that increased use of any antibiotics for longer period will leads to drug resistance in the bacteria.

INTRODUCTION

Community acquired Urinary Tract Infection (UTI) of about 80-85% is because of *E. coli*. Inflammatory response of urothelium to the invading pathogenic organism will leads to UTI, fever, dysuria, cloudy urine and urinary urgency are the main symptoms of UTI¹. 75% to 90% of UTI is due to because of the family members of Enterobactericeae that too by *E. coli*. This will account for more significant mortality and morbidity by UTI². Nitrofurantoin was least used in the treatment of UTI earlier because of the quinolones and Cotrimoxazoles activity. The increased drug resistance to Quinolones and Cotrimoxazoles, Nitrofurantoin was the drug of choice to treat the

uncomplicated UTI³. The increased usage of Nitrofurantoin has led to significant increase in the prevalence of Nitrofurantoin resistance among UTI causing bacteria now a days.

MATERIALS AND METHODS:

Collection of sample:

The samples were collected using pre-sterilized sample bottles from different persons. Precautionary measures were taken to minimize the contamination. The urine samples were collected from person suffering from urinary tract infection⁴.

Isolation of bacteria:

5ml of urine sample is taken in a clean sterilized centrifuge tubes and centrifuged at 2500 RPM for 2-3 minutes. Deposit was collected for the microscopic observation. One loop full of deposit in a inoculation loop make a primary well on MecConkey culture plate, from the primary well secondary and tertiary streaking were done on the plate and incubated in an incubator at 37°C for 24 hours. After incubation plates were ready for presence of any growth. Colonies were picked and sub-cultured to obtain pure culture. Stock cultures were maintained on Nutrient agar at 4°C. Positive culture processed in a usual manner for identification³. Microscopic observation did by Gram staining technique confirms the organisms is Gram -ve and IMVIC reactions and string test confirms the *E. coli* by biochemically and serologically⁴.

Source of Antibiotics: Procured from HiMedia laboratories Pvt. Ltd certified for ISO9001:2008, ISO 13485-2003, WHO GMP, Mumbai-400086. CL-Colistin (10µG), AK- Amikacin (30µG), AZM- Azithromycin(15µG), SPX- Sparfloxacin (5 µG), MRP- Meropenem (10µG), NIT- Nitrofurantoin (300 µG), CEP- Cephalexin(30 µG) AND PTZ- Piperacillin- Tazobactam (100/10 µG)⁴.

Antibiotic sensitivity study of *E.coli*:

0.5 McFarland standards turbidity inoculums were lawn cultured on a sterilized plates containing 10 to 15 ml of solidified culture media by Kirby-Bauer disc diffusion method. With help of sterilized forceps appropriate antimicrobial-impregnated disks were placed on the surface of the culture media. Each organism is tested with seven antibiotics to screen the multidrug resistance pattern of each organism. Plates were incubated in an incubator at 37°C for 24 hours. The results were tabulated⁵.

RESULTS

Twenty UTI suspected positive urine samples were screened for the *E. coli*. Antibiotic sensitivity of all the stains were tabulated in the Table 1 and it has been graphically represented in the Figure 1

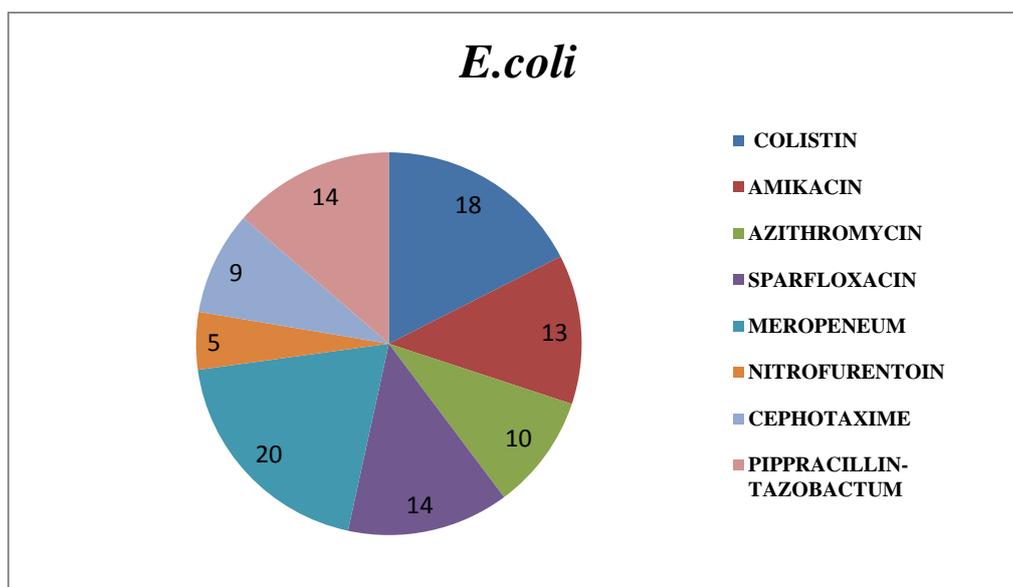


Figure 1: Antibiotic resistant pattern of *E. coli* in UTI

Table 1: Distribution of *E. coli* antibiotic resistant pattern in UTI

SL NO	ANTIBIOTICS	SENSITIVE	RESISTANCE
1	COLISTIN	90%	10%
2	AMIKACIN	65%	35%
3	AZITHROMYCIN	50%	50%
4	SPARFLOXACIN	70%	30%
5	MEROPENEUM	100%	00%
6	NITROFURENTOIN	25%	75%
7	CEPHOTAXIME	45%	55%
8	PIPPRACILLIN- TAZOBACTUM	70%	30%

According to the results obtained it was noted that the UTI suspected urine samples yielded *E. coli* and these strains revealed significantly more resistance to Nitrofurantoin is about 75%, Cephotaxime 55% and Azithromycin 50% cases

respectively. Among the 8 antibiotics Colistin is 90% and Meropenem is 100% sensitive to *E. coli* (Table 1 and Figure 1).

DISCUSSION:

The rate of resistance to Nitrofurantoin was concerning⁶. As the Nitrofurantoin is the presently most commonly prescribed therapy for UTI⁷. The rate of cure of complicated UTI by *E. coli* with the treatment of Nitrofurantoin is low⁸. The Nitrofurantoin resistance *E. coli* was isolated and studied in 1982 by Dr. Anthony's Pharmacist in UK, revealed that the genes responsible for resistance to Nitrofurantoin⁹. So now the first line (Empiric) treatment for uncomplicated UTI and acute cystitis by Nitrofurantoin is no doubt that there is a need of alternative medicine to treat the Nitrofurantoin resistance *E. coli*.

CONCLUSION

The present study conclude that the emergence of Nitrofurantoin resistant *E. coli* isolated from UTI are increasing with the increased usage of Nitrofurantoin antibiotic, limited use of Nitrofurantoin prescription may decreases the increasing Nitrofurantoin resistance in UTI caused by *E. coli*. Use of alternative medicine may helpful in eradication the drug resistance in *E. coli*.

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