

# Plasmid-Borne Drug Resistance Elimination Potential of Ethidium Bromide and Acridine Orange in Multidrug Resistant and Extensive Drug Resistant Escherichia Coli

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**ABSTRACT:** Multidrug resistant (MDR) and extensively drug resistant (XDR) E. coli strains generate diverse and severe infections like bacteremia and urinary tract infections (UTIs) worldwide. They mostly carry antibiotic resistance markers or genes on mobile plasmids making the treatment and eradication of such infections more problematic. Plasmid eliminating agents (Ethidium bromide and Acridine orange) could be advantageous in the expulsion of resistance bearing plasmids and eventually helpful in extermination of MDR and XDR-E. Coli.

## **Objective:**

This study was designed to determine the antibiotic resistance patterns of Escherichia coli isolates from patients with urinary tract infections and bacteremia. We also detected the antibiotics resistance profiles and compared the potential of curing agents in eliminating plasmid mediated antibiotic resistance.

## **Methods:**

Three hundred and fifty (350) E. coli isolates from patients diagnosed with urinary tract infections and bacteremia were taken. Antibiotic sensitivity testing was accomplished by following CLSI (2015) protocol. Sub- minimum inhibitory concentrations (SICs) of Ethidium bromide and Acridine orange were determined by broth dilution method in Luria Britani (LB) broth to find curing concentrations for resistance plasmids.

## **Results:**

E. coli which were (100%) resistant to Amoxicillin-clavulanate, Cefaclor, Cefuroxime, Cefixime, Ceftazidime, Cefepime, Cefotaxime, Ceftriaxone, Ciprofloxacin and Pipidemic acid (urine only) and were selected for curing analysis. About 46%, 16%, 14% and 14% of E. coli (blood isolates) were resistant to Cefoperazone- sulbactam, Imipenem, Meropenem and Amikacin, respectively. About 34%, 13%, 12%, 10%, 9% and 6% of E. coli from urine were resistant to Cefoperazone-sulbactam, Amikacin, Nitrofurantoin, Meropenem, Imipenem and Fosfomycin, respectively. Sub-minimum inhibitory concentrations (SICs) of Ethidium bromide and Acridine orange were

effective between 125µg/ml to 1000µg/ml for both curing agent but the most impressive resistance plasmid curing concentrations were 500-1000µg/ml and 500µg/ml of EthBr and AO, respectively. These both curing agents were able to displace Imipenem, Meropenem, Cefoperazone-sulbactam, Nitrofurantoin, Fosfomycin, Amikacin, Cefotaxime, Ceftazidime, Ceftriaxone, Ciprofloxacin and Cefepime resistance in E. coli. The most prevailing eliminated resistance was of Imipenem and Meropenem. The study proposes that Ethidium bromide and Acridine orange are pivotal in eradication of plasmid mediated antibiotic resistance in MDR and XDR-E. coli.