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Synergistic antibacterial effect of silver nanoparticles combined with ineffective beta lactam antibiotic on ESBL producing uropathogenic *E.coli* strains

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The increase in antibiotic resistance among Extended spectrum beta lactamases (ESBLs) producing uropathogenic *E. coli* is a major concern worldwide. ESBLs are diverse group of plasmid mediated enzymes produced by Gram negative bacteria. The current study included 120 uropathogenic *E. coli* strains isolated from a tertiary care hospital, Islamabad. A total of 72(60%) isolates were found to be ESBL producer. High rate of resistance was observed against ceftriaxone (100%), ciprofloxacin (94%) and cotrimoxazole (79%). Out of 72 ESBL *E. coli* isolates 51 (71%) of the isolates exhibited blaCTX-M genes, 21(29%) isolates were positive for blaSHV gene, 21(29%) isolates harbored both blaCTX-M and blaSHV genes while blaTEM gene was not detected in any isolate. Positive synergism was observed when silver nanoparticles synthesized from chemical reduction method using sodium borohydride as a reducing agent was combined with beta lactam antibiotics ceftriaxone were tested against ESBL *E. coli* strains. However, negative synergism was observed when silver nanoparticles and beta lactam antibiotic imipenem was combined. The present study concludes that there has been a rise in ESBL *E. coli* with polymorphism of blaCTX-M, blaSHV causing Urinary tract infections. The drug-AgNPs synergistic effect can be used to combat uropathogenic infections.