In Vitro Efficacy of Six Alternative Antibiotics against Multidrug Resistant Escherichia Coli and Klebsiella Pneumoniae from Urinary Tract Infections

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Abstract

Introduction: Increasing resistance in Escherichia coli and Klebsiella pneumoniae to firstline antibiotics makes therapeutic options for urinary tract infections (UTIs) challenging. This study investigated the in vitro efficacies of 6 antibiotics against multidrug resistant (MDR) uropathogens. Materials and Methods: Minimum inhibitory concentrations to ceftibuten, cefpodoxime, fosfomycin, mecillinam, temocillin, and trimethoprim were determined against 155 MDR-isolates of E. coli and K. pneumoniae. The presence of extended-spectrum beta-lactamases (ESBL) and plasmid-borne AmpC enzymes was determined by phenotypic testing with genotyping performed by multiplex polymerase chain reaction. Results: Temocillin demonstrated highest susceptibility rates for both E. coli (95%) and K. pneumoniae (95%) when breakpoints for uncomplicated UTIs were applied; however, temocillin susceptibility was substantially lower when “systemic infection” breakpoints were used. Fosfomycin demonstrated the best in vitro efficacy of the orally available agents, with 78% and 69% of E. coli and K. pneumoniae isolates susceptible, respectively. The next most effective antibiotics were ceftibuten (45%) and mecillinam (32%). ESBL and ampC genes were present in 47 (30%) and 59 (38%) isolates. Conclusion: This study demonstrated few oral therapeutic options for MDR-uropathogens, with fosfomycin demonstrating the best in vitro activity.

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Key words: Extended-spectrum beta-lactamases, Fosfomycin, Temocillin, Ceftibuten