IN VITRO SYNERGISTIC EVALUATION OF DIFFERENT ANTIBIOTICS AGAINST Klebsiella pneumoniae AND Staphylococcus aureus

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Antibiotic resistance has been globally recognized as a serious risk to public health concerning and continually challenging the scientific community. In this context Klebsiella pneumoniae e Staphylococcus aureus have shown the capability to develop remarkable resistance mechanisms causing severe bacterial outbreaks. One of the strategies developed to respond to infectious microorganisms consist in the utilization of synergistic compounds, which lead to an improved pharmacological response. In this scenario this study aims to determine the effects of combined antibiotics (penicillin G–PNG, chloramphenicol–CAP and streptomycin–SMA) in order to evaluate their synergistic activities toward infectious S. aureus and K. pneumoniae strains. Initially, a test of serial broth microdilution was performed in order to determine the minimal concentration inhibitory (MIC) value of antibiotics in 96-well microplate. The antibiotics combinations PNG/CAP (penicillin G with chloramphenicol), PNG/SMA (penicillin G with streptomycin) and CAP/SMA (chloramphenicol with streptomycin) were performed by using checkerboard assay. MICs of 300, 50 and 7 µM of PNG, CAP and SMA, respectively, were observed against K. pneumoniae. MICs of PNG, CAP and SMA at concentrations of 10, 25 and 7 µM were determined toward S. aureus. Checkerboard tests showed a synergistic activity in all associations tested with $\Sigma FIC \leq 0.5$ of antibiotics against both microorganisms studied. Amongst the associations against K. pneumoniae the most efficient combination was PNG/CAP ($\Sigma FIC = 0.14$). Moreover PNG/CAP and CAP/SMA ($\Sigma FIC = 0.16$) were highly efficient against S. aureus. The study showed that penicillin g, chloramphenicol and streptomycin were more active when combined with each other. In summary the antibiotic synergism strategy seems to be a therapeutic alternative for the K. pneumoniae and S. aureus infections treatment.

Keyword: synergism; antibiotics; bacterial resistance.

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