Investigating the Bactericidal and Anti-Biofilm Effects of Naringenin on Enterobacter cloacae

Siggers, Vanessa (School: Murphy High School)

Due to global threats of rapidly increasing antimicrobial resistance(AMR),and mortality and morbidity due to bacterial pathogens,discovery and implementation of solutions to AMR such as novel antimicrobial agents is crucial.The purpose of this study was to determine the effects of Naringenin concentration on Enterobacter cloacae(E. cloacae)growth and biofilm formation.It was hypothesized that as Naringenin concentration increased,absorbance measures would demonstrate significant decreases,indicating attenuation of E.cloacae growth and biofilm formation,and that Naringenin would exhibit bacteriostatic,bactericidal,biofilm inhibitory and biofilm degradative properties against E.cloacae.Microbroth dilution assays were performed to assess E.cloacae growth with varying concentrations of Naringenin,determine the Minimum Inhibitory Concentration(MIC) and Minimum Bactericidal Concentration(MBC).Microtiter plate static biofilm and crystal violet staining assays were utilized to determine how Naringenin concentrations effect biofilm formation and degradation and find the Minimum Biofilm Inhibitory Concentration(MBIC).Results showed significant reductions in E.cloacae planktonic growth,biofilm formation,and established biofilm biomass.Naringenin demonstrated bacteriostatic activity with a MIC of 312.5 ug/mL,bactericidal activity with a MBC 625 ug/mL,biofilm inhibitory activity with a MBIC of 1,250 ug/mL and biofilm degradative activity with a mean reduction in biofilm biomass of 41.31% at 2,500 ug/mL.There were statistically significant differences between absorbance value means of each concentration group of each assay,all with $p<0.001$ as determined by one-way ANOVA.Naringenin could be a potential antibacterial and antibiofilm agent against E.cloacae and associated pathogenesis.

Awards Won:
Fourth Award of $500