EFFECT OF QUINIC ACID, HYDROXYBENZOIC ACID AND HYDROXYCHAVICOLON ORAL BIOFILM


Department of Oral Biology and Biomedical Sciences, Faculty of Dentistry, University of Malaya, 50603 Kuala Lumpur, Malaysia

*Corresponding author email: hayatizain@yahoo.com

Phenolic compounds from plants possess wide range of biological activities. Other than exhibiting direct effect on microbial growth, many displayed antiadherence activity that disrupts the formation of oral biofilm. In the present study the antibacterial and antibiofilm activities of three phenolic compounds that include quinic and hydroxybenzoic acids, and hydroxychavicol were investigated against three early colonizers of the oral biofilm; Streptococcus sanguinis, Streptococcus mitis and Actinomyces naeslundii. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of each compound against the three bacteria were determined using a microdilution assay. MIC and MBC were carried out to indicate the growth inhibitory strength of the compounds on the respective bacteria. The antibiofilm activity was based on (i) changes of the bacterial cell surface hydrophobicity (CSH) and (ii) reduction in the population of adhering bacteria in 24-hr pre-formed biofilm following treatment with the respective compounds. The effect of the compounds were observed and compared at several sub-MICs. It was found that all three phenolic compounds showed significant growth inhibitory activity on S. sanguinis, S. mitis and A. naeslundii with MIC’s and MBC’s ranging from 50-70 μg/ml and 70-90 μg/ml, respectively. CSH of each bacterium was observed to decrease upon treatment with the active compounds. Significant bacterial reduction in the compound-treated 24-hr biofilm was recorded due to the biofilm-dislodging effect of the compounds (P<0.05). Comparative to hydroxybenzoic and quinic acids, hydroxychavicol was determined the most effective in decreasing bacterial population in the biofilm. Hydroxybenzoic acid on the other hand was more effective in partially removing the pre-formed biofilm. It was also observed that A. naeslundii biofilm exhibited resistance to hydroxychavicol at all sub-MICs. Data collected from this study suggested the selective antibacterial activity of the phenolic compounds on selected bacteria of the oral biofilm bacteria and thus, has potential to be developed antibiofilm agent in oral health care products.