Inhibiting Streptococcus mutans With Antibacterial and Antioxidant Hibiscus Polyphenolic Compounds

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Streptococcus mutans causes an accumulation of reactive oxygen species in the oral cavity, damaging tissue as salivary antioxidants are depleted. I hypothesized that a hibiscus treatment would inhibit periodontal disease due to the antibacterial and antioxidant properties of its polyphenolic compounds. To verify the antioxidant activity of a hibiscus mouthwash, participants swished around a concentrated hibiscus solution. I analyzed the absorbance of the free radical 2,2-diphenyl-1-picrylhydrazyl (DPPH) with saliva samples collected every 15 mins for up to one hour with a UV-vis spectrophotometer. Lower absorbance values (AU) were sustained for up to 45 mins with an average absorbance range of 0.21 AU to 0.64 AU measured at 517 nm as the DPPH was neutralized. I tested antibacterial potential with a disk diffusion assay of a 0.1% gallic acid concentration, 0.1% quercetin concentration, 10% hibiscus extract, water, and penicillin. The average zones of inhibition for the gallic acid, quercetin, and hibiscus concentrations were 0.12 mm, 0.44 mm, and 1.19 mm respectively after 48 hrs. An additional assay with a 28% hibiscus treatment was performed and yielded an average zone of inhibition of 2.23 mm. In both trials, hibiscus had statistically larger zones of inhibition than the water control and smaller zones than the penicillin control ($p<0.05$). Hibiscus has potential to be an antibacterial and antioxidant treatment, but quercetin and gallic acid may not be the primary antioxidants responsible for its antibacterial activity. More research with a larger sample size and more concentrated solutions is required.

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