Chewing Gum's Antimicrobial Activity Using Plant Derived Essential Oils and Xylitol

Narvaez-Ramos, Michelle

Aldarondo-Torres, Loren

Most nasopharyngeal infections are caused by strains of Staphylococcus aureus, Pseudomonas aeruginosa, and Escherichia coli. These bacteria are becoming increasingly resistant to pharmaceuticals thus alternative treatment options, such as homeopathic remedies, are now being assessed. Chewing gum's ability to gradually deliver pharmaceuticals have qualified them as a novel drug delivery system. The hypothesis is that commercial chewing gums supplemented with cinnamon bark (Cinnamomum zeylanicum), peppermint (Mentha piperita) essential oils, and xylitol will have an inhibitory effect on mentioned infection-causing bacteria. For stage one, the chewing gum was manually mashed with 1.0mL of water and 0.1mL of cinnamon essential oil. This procedure was repeated with peppermint essential oil and again with 1.5g of xylitol. In stage two, the essential oil concentration was increased by adding 0.25, 0.50, and 0.75mL. For each stage, the Kirby Bauer method was performed on TSA plates with a total of four replicas. After twenty-four hours of incubation at 37°C, their bactericidal activity was analyzed by measuring the inhibition zones diameter. The results were compared to the capacity of commercial antibiotics stated in literature. Cinnamon essential oil with E. coli equaled the optimum bactericidal capacity of Streptomycin (21mm). Cinnamon demonstrated to surpass Methicillin's bactericidal capacity (14mm) over S. aureus (15mm). All peppermint essential oil halos were mildly resistant to the bacteria (reaching 8mm). Xylitol demonstrated no bactericidal effect. As future goals, we want to create a medicated chewing gum using cinnamon essential oil as active ingredient, incorporating the technology of a biosensor to directly deliver the treatment.

Awards Won: