Inhibitory Effects of Three Sri Lankan Herbal Formulas on Acid Production and Biofilm Formation by Major Cariogenic Bacterium – *Streptococcus mutans*

K.S.N.D. Gunawardhana, B.G.T.L. Nandasena, B.M.H.S.K. Banneheka, N. Ranasinghe and M.P. Paranagama*

Department of Basic Sciences, Faculty of Dental Sciences, University of Peradeniya, Peradeniya 20400, Sri Lanka
**madhaviparanagama@gmail.com*

Dental caries is the most common oral disease of mankind. *Streptococcus mutans* is the primary etiological agent of dental caries. It metabolizes dietary carbohydrates to produce acids leading to tooth demineralization. This acidogenicity and the formation of a resilient biofilm are main factors contributing to their cariogenic potential. High incidence of caries in the community shows the need of alternative strategies to prevent this disease. Traditional herbal remedies (mouth fresheners, rinses, tooth brushing powders) are considered as effective alternative anticariogenic compounds. However, their scientific validation and characterization are scarce. This study aimed to analyze anticariogenic potential of three Sri Lankan herbal formulas. Formula I consisted of *Jasminum grandiflorum, Punica granatum, Elettaria cardamomum, Cinnamomum zeylanicum,* formula II consisted of *Cinnamomum Zeylanicum, Elettaria cardamomum, Pogostemonheyneanus* and formula III consisted of *Syzygiumaromaticum*, *Myristica fragrans*, *Elettaria cardamomum*, *Piper betle*, *Kaempferia galanga*, *Coriandrum sativum.* Their ability to inhibit the biofilm formation and acid production was evaluated by culturing *S. mutans* (ATCC 700610) in Tryptic soy broth containing 1% glucose with different concentrations (0.125 to 1 mg/ml) of methanolic extracts of herbal formulas in 12 well plates. Dimethyl sulfoxide and Chlorhexidine were used as negative and positive controls respectively. After 24 hours, pH of the cultures was measured and biofilm was stained with 0.1% safranin, photographed and analyzed. All three herbal formulas showed concentration dependent inhibition of *S. mutans* acid production and biofilm formation. Formulae I and II showed complete inhibition of *S. mutans* biofilm formation and acid production at a concentration of 0.5 mg/ml while for formula III it was 0.25 mg/ml. These results show that these 3 polyherbal formulas can inhibit the biofilm formation and acid production of *S. mutans*. Effect of these formulas on expression of genes responsible for *S. mutans* acid production and biofilm formation are in progress.

Keywords: Herbal formulas, *Streptococcus mutans*, Inhibitory effects, Acid production, Biofilm formation

Financial assistance from the University of Peradeniya (URG/2018/15/D) is acknowledged.