

Antimicrobial Effect of Seed Extraction of Cardamom (*Elettaria cardamomum*) on Mouth Odor Forming Bacteria

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Halitosis is an unpleasant odor that emanates from the oral cavity and Chlorhexidine included mouthwashes are a generally well accepted and popular way of dealing with halitosis. However most of these mouth washes merely provide a competing and temporary smell that is capable of masking the unfavorable malodor and may contain harmful chemicals such as alcohol and phenols. *Elettaria cardamomum* is used as a spice and ayurvedic medicine since ancient times and could be used in mouthwashes due to their pleasant aroma. In the present study, the antimicrobial effect of *E. cardamomum* seed extraction on mouth odor forming bacteria was investigated. Hot water extracts of *E. cardamomum* were obtained and concentration series (10000 ppm, 5000 ppm, 2500 ppm, 1250 ppm, 0 ppm) were prepared. Bacteria samples were obtained from pockets of oral cavity and posterior region of tongue and cultured on blood agar under anaerobic conditions. Antimicrobial activity test and odor test were carried out for the prepared concentration series. Ten replicates were used for one concentration in antimicrobial test and two replicates for odor test. This experiment was carried out using well diffusion technique and mean inhibition concentration (MIC) was determined based on the inhibition zones on the blood agar plates. Odor test was carried out using test panel of 8 members and a 0 ppm solution (blood agar broth) was used as a control for comparison after growing anaerobic bacteria. Cardamom seed extraction was added to other solutions according to the concentration and anaerobic conditions were given. A significant inhibition was observed on oral anaerobes and the effect was significantly increased with the increment of the concentration (Pearson correlation, 0.934, $p = 0.000$). A significant odor change was observed when compared with the control ($p = 0.000$) and 10000 ppm and 5000 ppm did not show any significant odor (One way ANOVA, Tukey Multiple Comparison Test). According to the results it can be concluded that *E. cardamomum* has antimicrobial effect on odor forming anaerobic bacteria and 5000 ppm could be identified as the MIC of cardamom extraction for the inhibition of anaerobes which form halitosis.

Keywords: *Elettaria cardamomum*, Odor forming bacteria, Antimicrobial activity