

TITLE: USE OF TRANS-CARYOPHYLLENE TO COMBAT BACTERIAL DENTAL PLAQUE FORMATION IN DOGS

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ABSTRACT

Periodontal disease is a highly prevalent illness that affects many dogs, reaching up to 85 % prevalence in individuals four years old. The drug of choice for combating the dental plaque, the etiologic agent of the disease, in these animals is chlorhexidine, which has several side effects reported. Thus, surveys are conducted throughout the world in order to identify potential substitutes for antimicrobial therapy and prevention of periodontal disease. The aim was to evaluate the antimicrobial activity of β -caryophyllene against bacteria from dog's dental plaque *in vitro* and *in vivo*. The minimum inhibitory concentration (MIC) was evaluated by agar microdilution assay, the induction or inhibition of bacterial adherence by sub-inhibitory concentrations in 96-well plates, and reduction of dental plaque formation in mongrel dogs subjected to topical solution with β -caryophyllene for 15 days. Results showed MICs above 100 mg/mL for 25 % of the isolates, 100 mg/mL for 3 %, 50 mg/mL for 25 %, 25 mg/mL for 12 %, 12.5 mg/mL for 19 % and 6.25 mg/mL for 16 %. Bacterial adherences of eight isolates were inhibited and three were stimulated to adhere by subinhibitory concentrations. *In vivo* assay showed reduction in dental plaque formation by β -caryophyllene, with final plaque coverage of 23.3 ± 2.6 % of the total area of the teeth, with significant difference compared with chlorhexidine group (37.5 ± 3.7 % - $p < 0.05$) and negative control group (65.5 ± 2.5 % - $p < 0.001$). Results showed minimum inhibitory concentrations above 100 mg/mL for 25 % of the isolates, 100 mg/mL for 3 %, 50 mg/mL for 25 %, 25 mg/mL for 12 %, 12.5 mg/mL for 19 % and 6.25 mg/mL for 16 %. Bacterial adherences of eight different isolates were inhibited by subinhibitory concentration. One *Lactococcus* sp., one *Bacillus* sp. and one *Streptococcus* sp. were stimulated to adhere by concentrations of 0.19, 1.56 and 0.78 mg/mL, respectively. *In vivo* assay showed reduction in dental plaque formation by β -caryophyllene, with final plaque coverage of 23.3 ± 2.6 % of the total area of the teeth, with significant difference compared with chlorhexidine group (37.5 ± 3.7 % - $p < 0.05$) and negative control group (65.5 ± 2.5 % - $p < 0.001$). The results showed that β -caryophyllene has antimicrobial activity against the proliferation of dog's dental plaque-forming bacteria representing a suitable alternative to the use of chlorhexidine in prophylaxis and treatment of periodontal disease of dogs.

Keywords: Antimicrobial Dogs Dental plaque Adhesion Natural phytochemical

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