



## Comparison of the antibacterial, antiplaque and anti-gingivitis activity of herbal mouthwash with chlorhexidine in dog

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### ABSTRACT

**Background & Aim:** Oral diseases including gingivitis and periodontal diseases are most common diseases in pets, especially dogs. The aim of this study was to evaluate the potency of herbal composition containing green tea extract as a mouthwash on preventing plaque formation and oral diseases in dogs.

**Experimental:** In order to achieve this goal, 20 male dogs selected and were divided randomly in to two groups including control (Chlorhexidine 0.1%) and treatment (herbal mouthwash) groups. total microbial cunt was performed in swab samples were taken from each dog-oral cavity. In addition, Silness-Loe Plaque Index System was used to evaluate the Improvement of dental plaque and gingivitis.

**Results:** Percentage of colonies reduction on the last day of the study compared with the first day in control and treatment groups are 84.90% and 73.41%, respectively. In addition, Silness-Loe Plaque Index for control and treatment groups is 0.71 and 0.75, respectively. Results of the present study indicate a favorable effect of herbal mouthwash to prevention and reduce plaque and bacteria in the mouth of pet animals.

**Recommended applications/industries:** The herbal mouthwash could reduce the aerobic mouth bacterial load and may prevent plaque formation on teeth and come over halitosis due to infection of the bacteria.

### 1. Introduction

Inflammation and recession of perialveolar gum margins are common findings in dogs and cats. These lesions are initially caused by excessive accumulation of dental plaque resulting from deposition of by-products from breakdown of food and saliva by normal

resident microflora (Crossley and Penman, 1995). Plaque is an organic matrix of salivary glycoproteins and polysaccharides adhering to the tooth surface that provides sites for oral bacteria to proliferate. Adjunctive management methods such as providing hard diets, regular tooth brushing, and oral hygiene chews have been shown to reduce the incidence of calculus accumulation (Emily and Penman, 1990;

Nelson and Couto, 2014). Treatment includes the extraction of severely affected teeth, debriding necrotic or proliferative gum margins, root planning with curettes, and scaling calculi from the remaining involved supragingival and subgingival dental surfaces by manual or ultrasonic means. In addition, flushing dental surfaces once daily with antibacterial material like 0.1% to 0.2% chlorhexidine or alternate-day brushing may delay accumulation of calculi. Unfortunately, chlorhexidine may stain teeth light blue and also leads to the re-accumulation of plaque (Greene, 2013).

Herbal extracts have been widely used in topical and oral applications for disease treatment in both animals and human. Green tea (*Camellia sinensis*), which is not fermented at all during the drying process, has numerous medicinal benefits mainly due to its antibacterial and antioxidant properties (LaGow, 2004). A short list of phenolic phytochemicals with promising properties to benefit human and animal's health includes a group of polyphenol compounds called Catechins which are found in green tea. Animals and humans that have tea compounds in their drinking water develop fewer dental caries and less plaque formation than those drinking plain water (Moghbel and Abbaspour, 2010; Wynn and Fougere, 2007). Therefore, the aim of this study was to evaluate the potency of herbal composition containing Iranian green tea extract as a mouthwash on mouth microbial load and then approving its effect on preventing plaque formation in dogs.

## 2. Materials and Methods

### 2.1. Herbal formula

Poly-herbal mouthwash (Camodex) used in this study was blended in Zist Dam Sepahan Co., Esfahan, Iran for the first time. The major component of Camodex is Iranian green tea extract and this product was standardized to contain 2.5% polyphenols.

### 2.2. Animals and Study design

The experiment was conducted on 20 male Persian shepherd dogs (with gingivitis and dental plaque) aging one to two years with 20-25 kg average body weights that were divided in two groups (n=10). The test group consisted of treatment and control group as follows: (i) control group were used chlorhexidine 0.1% spray; (ii)

treatment group were used Poly-herbal spray (Camodex). They have to use it twice daily each time three puffs in their mouth for 56 days.

### 2.3. Samples and microbial analysis

To evaluate the oral flora in the days 0, 14, 28, 42, and 56 swab samples were taken from each dog oral cavity. All samples were cultured on nutrition agar medium and then were incubated in 37 °C for 24 h. To investigate the bacterial load, all of the colonies on each plate were counted under loop.

### 2.4. Plaque Index

In order to evaluate the Improvement of dental plaque and gingivitis complete examination of the mouth was conducted in the days 0 and 56. The modified Silness-Loe Plaque Index System was used to compare the results of dental plaque and gingivitis (Fischman, 1986).

### 2.5 Statistical analysis

Data of this research were analyzed using Chi-Square by SPSS version 20.0 software by means of  $p < 0.05$ .

## 3. Results and discussion

To the best of our knowledge, the present study is the first report about effect of a mouthwash containing Green tea on gingivitis, plaque and microbial load of oral cavity in pet animals. The results showed that average colonies (Mean  $\pm$  SD) formed on the culture medium on days 0, 14, 28, 42, and 56 in the control group were 675.30  $\pm$ 306.52, 354 $\pm$ 153.23, 220.6 $\pm$ 117.86, 142.7 $\pm$ 93.99, and 99.80 $\pm$ 76.85, respectively. In addition, average colonies in same days in treatment group were 957.60 $\pm$ 485.11, 661.8 $\pm$ 314.73, 481.80 $\pm$ 190.37, 315.60 $\pm$ 139.60, and 228 $\pm$ 113.55, respectively. The results indicated that significant difference ( $p < 0.05$ ) between treatment and control groups (Table 1).

Averages of colonies reduction on the last day of the study compared with the first day in control and treatment groups are 84.90 $\pm$ 9.21 and 73.41 $\pm$ 10.36, respectively (Table 2). The modified Silness-Loe Plaque Index System was used to compare the results of dental plaque and gingivitis in the study population (Table 3). Although, the results of Silness-Loe index showed no significant differences between treatment

and control groups, but the positive effects of herbal mouthwash in preventing plaque formation were observed.

**Table 1.** Average colonies (Mean ± SD) formed on the culture medium during the investigation

Groups	0	14	28	42	56
Control	675±306	354±153	220±117	142±93	99±76
Treatment	957±485	661±314	481±190	315±139	228±113
P value	0.14	0.012*	0.002**	0.004**	0.008**

Systemic antimicrobials such as tetracycline, metronidazole, and tinidazole and topical chlorhexidine have been evaluated for treatment of periodontitis in experimentally affected dogs (Green, 2013). The uses of antibiotics and chemicals materials have irreversible effects on the health of the animals and humans. For this reason, several researches conducted for evaluation of herbal mouthwash in human. Effect of green tea on prevention of mouth bacterial infection, halitosis, and plaque formation on teeth were evaluated in human. A total of 25 volunteer female students, aged 20-25 years, were selected and then evaluated by green tea extract and mouthwashes containing 0.2, 0.5, and 1% tannin, as the most effective antibacterial complex in green tea.

**Table 2.** Averages of colonies reduction (Mean ± SD) during the investigation

Groups	14	28	42	56
Control	47±14	67±12	78±11	84±9
Treatment	26±16	44±14	62±18	73±10
P value	0.008*	0.002**	0.023**	0.017**

**Table 3.** Silness-Loe Plaque Index (Mean ± SD) during the investigation.

Groups	0	56
Control	1.27±0.57	0.71±0.38
Treatment	1.28±0.46	0.75±0.30
Pvalue	0.97	0.80

The result indicated that green tea mouthwash containing 1% tannin was more effective than other concentrations and there were no meaningful differences between the green tea mouthwashes containing 10% alcohol and alcohol free, as well as the herbal and chemical chlorhexidine 0.2% (Moghbel *et al.*, 2011). Other study aimed to determine the effect of green tea mouthwash on oral malodor, plaque, and gingival inflammation. After using for four weeks, green tea mouthwash could significantly reduce volatile sulfur compounds (VSC) level in gingivitis

subjects without causing remarkable side effects (Rassameemasmaung *et al.*, 2013). The results of the present study indicate that daily application of Camodex was effective in reducing recurrence of dental plaque and gingivitis in dogs.



#### 4. Conclusion

The herbal green tea mouthwash could reduce the aerobic mouth bacterial load and may prevent plaque formation on teeth and come over halitosis due to infection of the bacteria.

#### 5. References

Crossley, D. A. and Penman, S. 1995. *Manual of small animal dentistry*. British Small Animal Veterinary Association.

Emily, P. and Penman, S. 1990. *Handbook of small animal dentistry*. Pergamon Press plc.

Fischman, S. L. 1986. Current status of indices of plaque. *Journal of Clinical Periodontology.*, 13: 371-374.

Greene, C. E. 2013. *Infectious diseases of the dog and cat*. Elsevier Health Sciences.

LaGow, B. 2004. *PDR for herbal medicines*. Thomson PDR.

Moghbel, A. and Abbaspour, H. 2010. A study on the factors affecting the compressibility of green tea leaves powder to make a herbal tablet. *Scientific Medical Journal.*, 8:463-478.

Moghbel, A., Farjzadeh, A., Aghel, N., Agheli, H., Raisi, N. 2011. The Effect of Green Tea on Prevention of Mouth Bacterial Infection, Halitosis, and Plaque Formation on Teeth. *Iranian Journal of Toxicology.*, 5: 502-515.

Nelson, R. W. and Couto, C. G. 2014. *Small animal internal medicine*. Elsevier Health Sciences.

Rassameemasmaung, S., Phusudsawang, P. and Sangalungkarn, V. 2013. Effect of Green Tea

Mouthwash on Oral Malodor. *Hindawi Publishing Corporation.*, 1-6.

Wynn, S. G. and Fougère, B. 2007. *Veterinary herbal medicine*. Elsevier Health Sciences.