

Comparison of the Effects of an Herbal Mouthwash with Chlorhexidine on Surface Bacteria Counts of Dental Plaque in Dogs

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Oral diseases including gingivitis and periodontitis are common in pets, particularly dogs. In order to prevent them, chemical mouthwashes are generally used which have irreversible harmful side effects. The aim of the present study was to evaluate the potency of the herbal mouthwashes containing a mixture of Morte plant (*Myrtus Communis*), Chamomile (*Matricaria Recutita*) and Echinacea (*Echinacea Purpurea*) extracts on preventing plaque formation, gingivitis and periodontal diseases in dogs. In order to achieve this, 20 male dogs with clinical symptoms of oral diseases were randomly selected and divided into two groups. 0.1% Chlorhexidine and herbal spray were used for the control and treatment groups for 65 days, respectively. To evaluate the oral flora on days 0, 14, 28, 42 and 56, swab samples were taken from each dog oral cavity and cultured on nutrition agar medium. In addition, Silness-Loe plaque index system was used to evaluate plaque formation in both the beginning and at the end of the study. The reduction percentage of oral bacteria at the end of the study was measured as 84.90 and 73.41 for the control and treatment groups respectively, which was significantly different ($p < 0.05$). Also, Silness-Loe plaque index for control and treatment groups was 0.71 and 0.75, respectively. The results of the present study indicate a favorable effect of herbal mouthwashes to prevent plaque formation and reduce oral bacteria.

Key words: Antibacterial, antiplaque, anti-gingivitis, herbal mouthwash, Chlorhexidine.

Oral diseases primarily include gingivitis and periodontitis. Their most common symptoms include gingival inflammation and bleeding, bad breath, gingival recession and teeth loosening, that can be halted by prevention of plaque formation and their regular removal. Microbial plaques are soft accumulations due to the food residues that adhere to hard oral surfaces such as teeth and then are organized through bacteria, minerals and saliva secretions^{1,2}.

During plaque formation, salivary glycoproteins adhere to the clear surfaces of teeth

and form pedicle layer. In a few hours, food residues and existing oral bacteria are added to this pedicle layer and begin to proliferate. Later, other forms of microorganisms adhere to this formation as well, the result of which is a mature microbial plaque containing a collection of microorganisms in an intercellular matrix^{3,4}.

Antiplaque substances usually prevent plaque formation by anti-microbial properties. Chlorhexidine is an extended spectrum antibacterial substance that leaves long term effects by adhering to the oral substances. The limitations associated with Chlorhexidine include: tooth staining, an increase in calculus formation, taste disturbance and carcinogenic effects⁵.

Recently, using herbal medicines has remarkably increased because of their efficacy and

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few side effects. The antibacterial and anti-inflammatory effects of many herbal medicines have been tested and approved by many researchers internationally⁶.

Mort plant (*Myrtus Communis*) is disinfectant, anti-inflammatory, stomach tonic, and can eliminate bad breath, respiratory and urinary tract diseases. The essence of this plant has strong antibacterial effects on Gram-positive bacteria and fewer on Gram-negative ones. Mono and Sesquiterpenes existing in Mort essence have antibacterial, antifungal and disinfection effects. Some studies have illustrated that the essence of this plant prevents the growth of *Staphylococcus aureus* and *Pseudomonas aeruginosa* bacteria. Additionally, it has remarkable effects on *Microsporium canis*, *Microsporium gypseum* and *Trichophyton mentagrophytes* fungi^{7, 8, 9}.

Chamomile, scientifically known as *Matricaria recutita*, is a plant from Asteraceae family that is widely used in traditional medicine and has pain soothing, antispasmodic, anti-inflammatory applications. Moreover, it is used in skin problems such as psoriasis, rashes, acne, and for the treatment of bronchitis, cold, cough and fever^{10, 11}.

In the past, Echinacea or coneflower, native to America, was used for the treatment of snake bites, oral and gingival diseases and cold. In addition to stimulating the immune system, this plant has antiviral and anti-inflammatory properties. The effective components of this plant include Echinacoside, Chlorogenic acid, Chicoric acid, Cynarine and Caffeic acid. The anti-inflammatory and renewal effects depend on the quantities of its components^{12, 13}.

Therefore the main purpose of the present study is to compare the antibacterial, antiplaque and anti-inflammatory effects of an herbal mouthwash with Chlorhexidine in oral flora of dogs.

MATERIALS AND METHOD

The present study is a single-blinded research conducted on 20 dogs referred to a pet clinic. After primary examinations, registration of characteristics and clinical symptoms (including age, sex, keeping condition, respiratory and heart rates, mucosal condition, nutrition, dental and

gingival conditions,...), and similar anti-parasite treatments on all animals, they were randomly divided into two groups of 10. For the first group, oral spray containing %1 Chlorhexidine was used daily; while, herbal oral spray was used daily for the second group (Each 100cc of herbal spray contained %5 aques and alcoholic extract of Mort plant, %5 aques and alcoholic extract of Echinacea and %2 aques and alcoholic extract of Chamomile, the quantity of which was later increased to 100cc by addition of ionized distilled water). The research was conducted twice daily for two months on both groups, including 3 puffs of sprays each time. In order to examine the oral flora on days 0, 14, 28, 42 and 56, sterile swab samples were taken from each dog oral cavity. The collected samples were transferred to a veterinary college microbiology laboratory under sterile condition to be cultured on agar nutrition medium (impact culture method was used to culture and count colonies). The changes related to each dog were recorded. In order to record Silness-Loe plaque index, the teeth conditions were divided into 3 groups, ranging from 0: no plaque to 3: severe plaque and gingival pockets, and condition of each of 4 Carnassial teeth surface were evaluated and the mean score for each dog was recorded.

RESULTS

Clinically, none of the sprays in this research had a harmful effect (such as allergic reactions) on studied animals. Both bad breath and gingival inflammation reduced significantly in the two groups compared to the first day. However, this reduction was remarkably more in the group where herbal spray was used. According to the results, the mean of colonies formed on agar nutrition medium in the control group (%1.0 Chlorhexidine) on days 0, 14, 28, 42 and 56 were 675.30 ± 306.52 , 354 ± 153.23 , 220.6 ± 117.86 , 142.7 ± 93.99 and 99.80 ± 76.85 , respectively. Also the number of colonies in the treatment group on days 0, 14, 28, 42 and 56 were 957.60 ± 485.11 , 661.8 ± 314.73 , 481.80 ± 190.37 , 315.60 ± 139.60 and 228 ± 113.55 , respectively. The reduction percentage of colonies, comparing the last and the first day of the research in both control and treatment groups, were measured as 84.90 ± 9.21 and 73.41 ± 10.36 , respectively. To evaluate the reduction of plaque

in both the control and treatment groups, Silness-Loe index was used, that at first and the end of the study was recorded as 1.272 ± 0.57 and 0.71 ± 0.38 for the control group, and 1.28 ± 0.46 and 0.75 ± 0.30 for the treatment group (herbal spray group). Silness-Loe did not show any significant differences between the research days, nor between the two groups.

The analysis of the results by the SPSS software and Chi-squared test showed significant results for all the days of the research ($P > 0.05$). According to the results, bacterial colonization in the group where 1% chlorhexidine was used was considerably lower than the treatment group.

DISCUSSION

Oral diseases are primarily gingivitis and periodontal diseases, the most common symptoms of which are gingival inflammation and bleeding, bad breath, dental plaques, gingival recession and teeth loosening^{1, 2, 14}. These problems can be avoided by preventing dental calculus and plaque formation or their regular removal. Antiplaque substances usually prevent plaque formation by their antimicrobial properties. Chlorhexidine is a wide spectrum antibacterial substance that leaves long term effects by adhering to oral substances. Staining the teeth, impairment of taste sensation, and carcinogenic effects are among some of its limitations^{1, 2, 14}.

Scientific developments and the discovery of complicated process to extract the effective herbal components such as essences and extracts have increased the application of herbal materials in pharmacological industry as harmless yet effective compounds. Also recently, the number of known herbal medicines has increased and their applicability has been expanded. The discovery of new plants from abroad, achieving modern applications as subsidiary medicines in chemical and antibiotic treatments, the discovery of health value of plants, and finally the discovery of new substances such as vitamins, hormones, antimicrobial, antiviral and anti-tumor substances in already known or recently known plants, has developed herbal medicine¹⁵.

Since the effective components of herbal medicines are accompanied with other substances, they usually have a biological balance. Therefore,

they do not accumulate in body and do not cause any side effects. Thus, in this research, a purely herbal spray was used to prevent and cure oral and dental diseases.

The research conducted by Kyllar in Australia investigated oral and dental diseases in 408 dogs and proved the existence of various forms of the disease in 85.3% of the research population¹⁴. The highest percentage (60%) was related to periodontal diseases, followed by dental stones (61.3%). Also according to this research, lost teeth and unusual erosions were 33.8% and 5.9% of the diseases, respectively.

In another research in Sydney, the relationship between diet and dental and oral diseases was investigated in dogs and cats. The research indicated that soft foods in animals' diet caused more oral and dental diseases, specifically periodontal problems, in comparison with drier, harder foods¹⁶.

The study done by Schiott and Leo in 1970, illustrated that the maintenance of oral hygiene with the daily use of 10ml of 0.2% Chlorhexidine gluconate solution can reduce plaque formation and gingivitis for up to 60% and 50-80%, respectively¹⁷. The research conducted by Chitsazi et al., in which the effect of herbal and chemical oral sprays on periodontal diseases in human were compared, indicated that the reduction of plaque index in chemical oral spray (Chlorhexidine) was more than herbal oral spray group¹⁸. However, in staining test, the severity and number of colored areas were more in chemical oral spray than herbal oral spray (Chamomile).

In addition in a clinical comparison of Persica oral spray (Chamomile) with Chlorhexidine on dental plaque and gingivitis performed by Moein Taghavi, it was proved that Persica herbal oral spray was effective in reduction of dental plaque and gingivitis thus can be recommended to control these problems¹⁹.

In an in vitro study done by Yaskell et al., on antibacterial properties of two herbal and chemical oral sprays on isolated bacteria from periodontal disease, it was shown that herbal oral spray is more effective in reduction of oral bacteria growth²⁰.

In another study by Dalia on the antimicrobial effects of Mort leaves alcoholic extract on *Streptococcus* strains isolated from

human saliva was evaluated²¹. The results indicated that Mort leaves alcoholic extract has the potential to reduce bacteria colonization specially *Streptococcus* strains in teeth.

In a research by Ahmadi et al., the investigation of the effect of Chamomile oral spray on the prevention of chemotherapy-induced stomatitis indicated that Chamomile can effectively prevent stomatitis in these patients and improve both the quality of treatments and life in patients undergoing chemotherapy²².

In the present study, both the herbal and chemical sprays used for animals considerably reduced oral bacteria, gingivitis and bad breath compared to the first day of the study. However the reduction of gingivitis and bad breath in the group using herbal spray composed of Mort plant, Chamomile and Echinacea was remarkably more. According to the studies done by other researchers and based on the fact that prolonged use of chemical sprays such as Chlorhexidine can cause harmful dental and oral effects, the herbal spray used in this research leaves long term favorable effects in treatment and prevention of gingivitis, dental plaque and bad breath. Also, it does not fully damage oral micro flora which gives it priority over chemical spray.

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