

## **The Effect of German Chamomile Mouthwash on Dental Plaque and Gingival Inflammation**

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### **Abstract**

Dental plaque is a well known etiologic factor for gingivitis. Recently, herbal extracts are a matter of scientific interest to inhibit plaque accumulation on teeth. The purpose of this study was to evaluate the effects of German Chamomile (GC) mouth wash on plaque and gingival indices.

Twenty five gingivitis patients (15 female and 10 male, mean age  $27\pm 7.76$  years) participated in this controlled, double blind cross-over study. The subjects used either GC or a control rinse for 2 min twice a day during a 4 weeks period. The other mouth rinse was used after a wash-out period of 4 weeks in the same way. The plaque and gingival indices were recorded at baseline and after each experimental or wash-out period. Furthermore, stain indices for intensity and extend were recorded to evaluate the tooth staining effects of the mouthrinses. The mean reduction in plaque and gingival scores were determined by using the test or control mouthwash and statistically analyzed by paired sample t- test. The stain intensity and extend in each period of the study were also analyzed by the two-way ANOVA.

The GC mouthwash lowered both plaque and gingival scores significantly in comparison to the control rinse ( $p\leq 0.001$ ), whilst there was no significant difference in stain intensity or extend between the baseline and after each period of the study. There was also no report of any adverse reactions during the use of mouth rinses in this the study.

Using GC mouthwash appears to offer benefit in plaque and gingival reduction without any significant adverse effects on tooth staining.

**Keywords:** German Chamomile; Gingivitis; Mouthrinse; Dental Plaque; Tooth staining.

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### **Introduction**

Optimal plaque control is essential to prevent and/or arrest the uncomplicated gingival inflammation (1, 2). Mechanical measures such as tooth brushing and other home devices are the most commonly used methods to clean the teeth. However it has been revealed that

the vast majority of patients will not always completely remove all the plaque by these ways (3). Furthermore for handicapped or elder individuals use of the mechanical methods is more problematic due to their compromised dexterity or motivation (4, 5). To overcome those shortcomings chemical plaque control has been a subject of scientific interest (6, 7). Chlorhexidine (CHX) is considered the most common and extensively studied chemical agent for plaque control to date (8, 9). However, local

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side effects such as tooth staining, taste altering and desquamation of oral mucosa have limited the long-term use of CHX (10). Alternative agents based on herbal extracts are therefore of particular interest. There is some evidence indicating the beneficial effect of plant extract on gingival inflammation and plaque accumulation (10-13) or subgingival periodontopathic microorganisms (14). German Chamomile (GC) has been known as an anti-inflammatory, antibacterial and bacteriostatic, wound-healing promoter and deodorant and has been used in combination with other herbal ingredients as mouthwash or dentifrice to reduce plaque growth and to improve the gingival health (15). Despite the encountering data for the efficacy of GC in combination with other ingredients, there has not been any direct, controlled study on the effects of GC extract alone on plaque accumulation or gingival status. This study was aimed to evaluate the effects of the pure extract of GC on dental plaque and gingival inflammation indices to determine whether it can provide any benefit without the addition of other additives.

## Experimental

### *Preparation of the chamomile mouthwash*

Air-dried and powdered flowerheads of *Matricaria chamomilla* (1 kg) were percolated successively at room temperature with 55% EtOH. The combined EtOH extracts were filtered and evaporated under vacuum at low temperature and the dried residue (87.6 g) suspended in water. Thus, 1 kg of the concentrated liquid extract (the chamomile mouthwash) was obtained.

### *Study population*

A group of 25 volunteers (15 female and 10 male; mean age  $26 \pm 7.76$  years) from the referrals of Periodontics clinic (Faculty of Dentistry, Tabriz Med. Sci. Univ), were recruited for this study. All the subjects had merely gingivitis (pocket depth  $\leq 3$  mm, no attachment loss) and without any fixed or removable oral appliances. Individuals who had a history of any relevant systemic diseases or drug usage were excluded. The eligible subjects were informed regarding the purpose of this study and the products being evaluated. Before entering the study, each of

them provided a signed (witnessed) consent to participate in this study.

### *Study design*

The present study had a controlled double blind cross-over experimental design. It consisted of 2×four week experimental periods, separated by a four weeks wash-out period.

Plaque (16), gingival (17) and stain (18) indices were recorded for all the subjects at baseline, followed by random assignment to receive the test or control mouthrinses. The indices were measured again by the same clinician (R.P) at the end of the first and second experimental periods and also after the wash-out period of the study. In each experimental period, one of the test or control mouthwashes was dispensed by a clinic staff that was external to the study and kept a sealed code breaker. The mouth rinse bottles given to the participants were unlabeled.

The test mouthwash contained the German Chamomile extract and the control had only the solvent without any herbal extract or other ingredients, but with a similar appearance and bottle. The participants were instructed to continue their usual oral hygiene measures and not to use any other mouthrinse for the duration of this study.

The subjects were demonstrated to dilute 20 drops of the mouthwash with 20 ml of water and rinse it for 2 min, twice daily (once taken at night just before the bed time) over the 4 week study periods. The test and control mouthwashes were changed alternatively at the beginning of each study period, except for the wash-out period, in which they did not use any mouthwash. The participants' compliance was evaluated by measuring the remaining volume of the mouthwash that they brought back during their recalls. They were also asked to report any adverse reactions experienced during the use of mouthwashes.

### *Statistical analysis*

The mean reduction in plaque and gingival scores by the test and control rinses were calculated. Since data were normally distributed, as examined by the Kolmogorov-Smirnov statistical test, therefore the paired sample t-

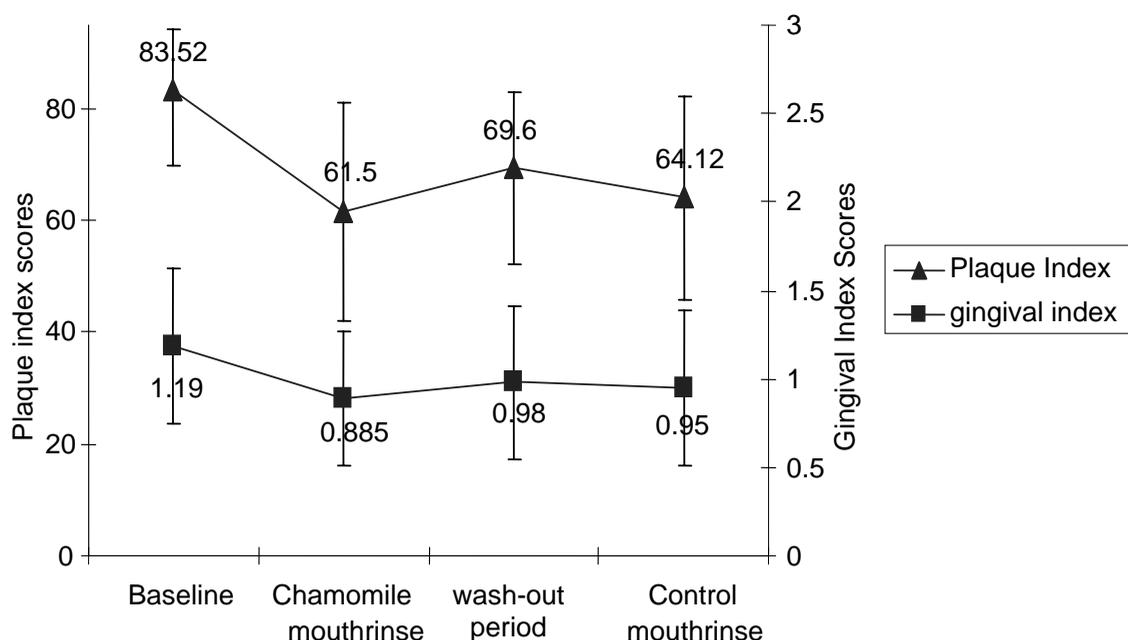


Figure 1. Changes in the gingival and plaque indices scores over the study period. Data have been expressed as mean±SD (n= 25).

test was used to detect significant differences. Two sided values of  $p \leq 0.05$  were accepted as significant. Two way ANOVA was applied to compare the mean stain index scores of baseline and after using the GC and control mouthwashes.

### Results and Discussion

All participants satisfactorily completed the study and their returned mouthwashes indicated a good compliance without any significant difference between the residual volume of GC or control rinse. There was also no report of any adverse effects by mouth-washing with the test or control solutions.

The mean plaque and gingival scores after each study period are shown in Figure 1. For both measures, the mean results were greatest on baseline and notably decreased after the rinsing period by GC extract. However, after the wash-out period, both indices were slightly lower than the baseline.

As the data in table 1 reveals, the mean

reduction for plaque and gingival indices by GC mouthwash was significantly greater than the control rinse ( $p \leq 0.001$ ).

Comparison of stain indices (area and intensity) scores by the two way ANOVA test verified that there was no significant difference between the baseline, GC mouthwash and the control rinse ( $P=0.53$  for area and  $p=0.30$  for intensity). Statistical analysis failed to detect any significant difference between males and females among all the variables measured in this study.

*Matricaria Chamomilla* is a well known ingredient in alternative medicine. It has been intended for numerous purposes from dermatological to gastrointestinal and even neurological and psychiatry (19). Combination products with Chamomile as tooth paste or oral rinse, have demonstrated beneficial effects on the status of oral hygiene (11, 13, 20).

Despite the fact that commercial mouth rinses which contain only the GC extract without any other additives are available, insufficient evidence regarding controlled studies to evaluate

Table 1. Comparison between the German Chamomile mouthwash and the control rinse (mean±SD).

Variable's name	Chamomile mouthrinse	Control mouthrinse	N	P -Value
Plaque index reduction	22±17.83	5.4±7.93	25	0.001
Gingival index reduction	0.31±0.23	0.03±0.11	25	0.000

their effectiveness, led to conduction of this study.

The present study showed that the GC mouthwash resulted in a 0.31 reduction in the gingival index scores, which were significantly better than the control rinse (0.03). These findings would confirm the previous studies which have stated the ability of herbal extracts to reduce the gingival inflammation parameters (11, 12, 20, 21).

Anti-inflammatory effects of Chamomile extract have been investigated in numerous studies (22) and it could be attributed to a particular component of the mouthrinse. Salicylic acid in the form of a methyl ester provides an anti-inflammatory effect in the GC mouth rinse (20). The effect of mouthwashes containing salicylic acid, e.g. Listerin®, on gingival inflammation and plaque accumulation has been well documented by both long-term and short-term studies (23). The other constituents which are found in whole plant chamomile extract are flavonoids, including apigenin, chamazulene and  $\alpha$ -bisabolol. The flavones act as anti-inflammatory agents due to interfering with the arachidonic acid pathway (24). Furthermore, it has been stated that the GC extract promotes wound healing by decreasing the inflammatory responses and accelerating granulation and regeneration of the tissues on topical application (19).

In accordance with various studies which have shown that the plant extracts can inhibit plaque accumulation (15, 20) and suppress the subgingival pathogens (16) in the present study plaque scores were reduced by 22%. Although this was significantly higher than the control rinse, some *in vitro* studies have failed to reach the same results and suggested that the *in vivo* efficacy of herbal based mouthrinses in reducing plaque accumulation has to be explained by other mechanisms (18). Again, the components of the mouthrinse seem to be a crucial factor and the studies which have employed other plant extracts could not demonstrate any benefit on plaque growth and gingival health (26).

Although CHX has a proven role in reducing plaque accumulation, tooth staining is the major limiting factor for its use in daily practice (27). This has led to continuous and extensive

investigations, seeking alternative agents. This study showed that chamomile mouthwash has no significant effect on the staining of tooth and that there was no significant difference between the stain indices scores of baseline and rinsing by the test or control mouthwashes.

We observed that both plaque and gingival scores slightly decreased after the wash-out period in comparison to the baseline. This may be attributed to subconscious motivation by the subjects to intensify their oral hygiene during their participation time. Considering the random alternation in dispensing the test and control mouthrinses and the lack of any significant differences between the plaque scores of the baseline and after the wash-out period of this study (data was not shown), the above mentioned finding would not be attributed to any bias in this study.

Based on the results of this investigation, using the GC mouthwash twice daily for 4 weeks, could reduce both the plaque accumulation and gingival inflammation. Hence, this product could be prescribed as an adjunct to daily oral hygiene measures.

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