

COMPARATIVE EVALUATION OF THE EFFICACY OF FENNEL MOUTHWASH WITH CHLORHEXIDINE MOUTHWASH, AS AN ADJUNCT TO SCALING AND POLISHING IN THE TREATMENT OF GINGIVITIS – A RANDOMIZED CONTROLLED TRIAL

Periodontology

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ABSTRACT

Introduction: Chlorhexidine gluconate, a bis-biguandine, has routinely been used as an effective antibacterial solution in dentistry. However, it is not recommended for long term use due to its numerous adverse effects like tooth and restoration staining, soft tissue staining, increase calculus deposition, unpleasant taste alterations, burning sensation, desquamation, and mucosal irritation. Natural herbs like fennel seed (*Foeniculum vulgare*) have been scientifically proven to be effective medicine against various oral health problems. The essential oil from the seed has antibacterial, antifungal, antioxidant, and anti-inflammatory properties. Thus, this study is an attempt to compare the efficacy of fennel and chlorhexidine mouthwash as an adjunct to scaling and polishing in the treatment chronic gingivitis. **Materials & Methods:** The study was conducted on total of 32 subjects (18-35 years). Subjects underwent scaling and polishing following which they were divided into 2 groups: Group 1 (subjects using fennel mouthwash) and Group 2 (subjects using chlorhexidine mouthwash). Plaque accumulation was assessed by plaque index (Silness and Loe, 1964) and gingival inflammation by gingival index (Loe and Silness, 1963). Baseline data was collected prior to start of study and after intervention, data was collected on 7th day and 14th day. **Results:** Both the mouthwashes resulted in reduction of gingival index values at 14 days from baseline exhibiting anti-inflammatory property. On intergroup comparison over a period of 14 days, the mean plaque index difference from baseline to 7 days and baseline to 14 days were statistically significant in both the groups. No adverse effects were reported in fennel mouthwash group. **Conclusion:** Fennel is comparable to chlorhexidine as an anti-inflammatory mouthwash, and it can be effectively used as an adjunct to mechanical therapy in the treatment of gingivitis.

KEYWORDS

Fennel mouthwash, Chlorhexidine, Gingivitis, Scaling.

INTRODUCTION

Dental plaque is considered the sole prominent factor for initiation and progression of periodontal disease¹. Plaque control can be advocated by means of mechanical (brushes, floss, and interdental aids) and chemical means. Along with mechanical mode of plaque control, chemical plaque control too has gained popularity due to its unique characteristics².

A number of chemical plaque control agents have been advocated, which are either available in a dentifrice or in the form of a mouthwash. Chemical plaque control agents act as adjuncts to conventional mechanical plaque control and interfere with biofilm composition. Chlorhexidine (CHX) is one of the most effective antimicrobial agents for plaque control³. Long term use of chlorhexidine mouth rinse can lead to brown discolorations of teeth and tongue, oral mucosa erosion and taste perturbations, rarely unilateral or bilateral parotid swellings are also seen⁴.

Hence, there is a need of an alternative medicine which is safe and economical. Natural herb like Fennel (*Foeniculum vulgare*) is highly aromatic and flavorful herb with culinary and medicinal uses. It belongs to Umbelliferae family. Fennel fruit is a dry seed, traditionally used as anti-inflammatory, analgesic, carminative, diuretic and antispasmodic agent⁵.

Fennel seeds (*Foeniculum vulgare*) have been scientifically proven to be effective medicine against various oral health problems. The essential oil from the seed has antibacterial, antifungal, antioxidant and anti-inflammatory properties⁶.

Thus, the aim of the study was to evaluate and compare the efficacy of fennel mouthwash with chlorhexidine mouthwash as an adjunct to scaling and polishing in the treatment of gingivitis.

MATERIAL AND METHODS

32 subjects diagnosed with gingivitis were included in the study after obtaining ethical clearance from the Institutional Ethical Committee. The subjects were selected based on the following inclusion and exclusion criteria.

The inclusion criteria included subjects of either sex in the age group of 18-35 years, with minimum of 20 teeth present, having mean plaque score ≥ 1 according to plaque index (PI) (Silness and Loe, 1964), having gingival index score ≥ 1 (Loe and Silness, 1963) and systemically healthy subjects.

Subjects with history of antibiotic and/or anti-inflammatory drugs

within previous 6 months, presence of fixed partial dentures or removable partial dentures or any orthodontic appliances, medically compromised subjects, pregnant women, women on oral contraceptive medication and lactating mothers, subjects who were smokers and/or tobacco chewers, subjects who had undergone any periodontal therapy in past 6 months, subjects allergic to components of fennel and chlorhexidine mouthwash were excluded.

Simple randomization technique was used with computer generated random number table. Allocation of subjects into groups was done by a 3rd person using concealed envelope. The study was a single blinded study in which the subjects were blinded.

Case history was recorded for all the subjects participating in the study. Scaling and polishing were carried out for all the subjects participating in the study. Standard oral hygiene instructions were given to all the subjects participating in the study. Subjects were advised to rinse with 10ml of mouthwash for 1 min twice a day after 30 minutes of tooth brushing.

0.2% Chlorhexidine gluconate mouthwash was procured from Group Pharmaceuticals Ltd. (Guard - OR). Fennel mouthwash was procured from Himalaya Herbals (Himalaya Active Fresh Saunf Mouthwash)

Assessment of Clinical Parameters

The clinical parameters evaluated at baseline, day 7 and day 14 of follow up were Plaque Index [PI] (Silness and Loe, 1967) and Gingival Index [GI] (Loe H and Silness J, 1963).

Group 1: Scaling and polishing followed by fennel mouthwash twice daily for 2 weeks.

Group 2: Scaling and polishing followed by 0.2% chlorhexidine mouthwash twice daily for 2 weeks.

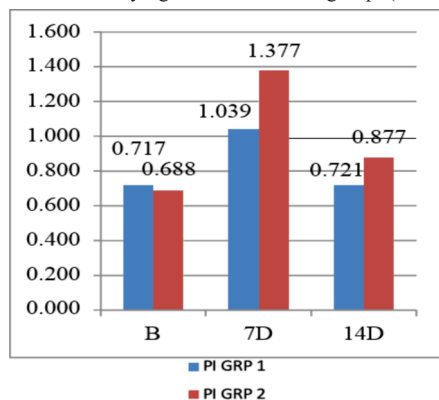
Statistical Analysis

Data was subjected to statistical analysis using Statistical package for social sciences (SPSS v 21.0, IBM). Inter group comparison (2 groups) was done using t test. Intra group comparison was done using repeated measures ANOVA (for >2 observations) followed by post Hoc test. For all the statistical tests, $p < 0.05$ was statistically significant, keeping α error at 5% and β error at 20%, thus giving a power to the study as 80%.

RESULTS

On intragroup comparison for PI, there was a statistically non-significant difference seen in group 1 and group 2 ($p < 0.01$) from baseline to 14 days. The mean PI values for group 1 and group 2 are

demonstrated on Graph 1. On intergroup comparison over a period of 14 days, the mean PI difference from baseline to 7 days and baseline to 14 days were statistically significant in both the groups (Table-1).

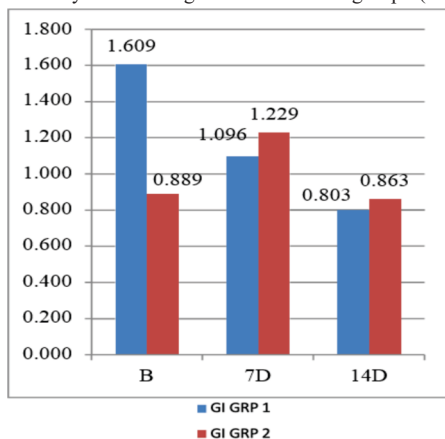


Graph - 1 Inter group comparison of PI

Table - 1 Inter Group Comparison

Groups	N	Mean	Std. Deviation	Std. Error Mean	p value of t test
PI 1	16	.716	.1692	.042	.676
B 2	16	.688	.213	.053	
GI 1	16	1.608	.612	.153	.001
B 2	16	.889	.476	.119	
PI 1	16	1.038	.135	.033	.000
7D 2	16	1.376	.259	.064	
GI 1	16	1.096	.246	.061	.123
7D 2	16	1.229	.228	.057	
PI 1	16	.720	.231	.057	.046
14D 2	16	.876	.190	.047	
GI 1	16	.802	.189	.047	.362
14D 2	16	.862	.177	.044	

On intragroup comparison for GI, there was a statistically significant reduction seen in group 1 ($p < 0.01$) from baseline to 14 days, whereas it was non-significant in group 2. The mean GI values for group 1 and group 2 are demonstrated on Graph 2. On intergroup comparison over a period of 14 days, the mean GI reduction from baseline to 7 days and baseline to 14 days was non-significant in both the groups. (Table-1)



Graph - 2 Inter group comparison of GI

No adverse effects in the form of allergic reactions and/or oral lesions were reported by subjects using fennel mouthwash.

DISCUSSION

Fennel is medicinal herb traditionally used for treating various diseases. Volatile oils like anethole are present in the *Foeniculum vulgare* which play an important role in treating various diseases. It is known to possess anti-inflammatory effect, antibacterial, antifungal and antioxidant properties. The extract of seeds inhibits the growth of micro-organism, especially *Streptococcus mutans* that are responsible for dental caries and periodontal diseases.

Chlorhexidine is a broad-spectrum antimicrobial agent which has its effect on gram positive bacteria, gram negative bacteria and on fungi and viruses.

However, long term use of chlorhexidine mouthwash can lead to brownish discolorations of teeth and tongue, oral mucosal erosion, and taste perturbations, rarely unilateral or bilateral parotid swellings are also seen⁷. Hence, a need was felt for an alternative medicine which was not only safe and economical but could also provide a product readily available within the traditional Indian setup.

So, this present study was conducted to evaluate and compare the efficacy of fennel mouthwash with chlorhexidine mouthwash as an adjunct to scaling and polishing in the treatment of gingivitis.

Bhatnagar P et al (2017) ⁶ conducted study to evaluate and compare antimicrobial efficacy of chlorhexidine gluconate and fennel seeds against streptococcus mutans and lactobacillus acidophilus. They concluded that Chlorhexidine and fennel seed are effective in inhibiting the growth of cariogenic bacteria like *Streptococcus mutans* and *Lactobacillus*.

Singh G et al (2006) ⁸ conducted a study to evaluate antifungal and anti-oxidant potential of *Foeniculum vulgare*. They concluded that *F.vulgare* possesses good antifungal activity. Volatile oil and extract from *F.vulgare* showed strong anti-oxidant activity.

Krishnan A et al (2014) ⁹ conducted an invivo study to the evaluate effects of the fennel seeds chewing on salivary pH. They concluded that chewing of fennel seeds showed a rise in salivary pH, which can prevent demineralization and have an anti- cariogenic effect.

Till date, there is no published study stating the effects of fennel mouthwash in the treatment of gingivitis. In the present study, there was a statistically significant reduction seen in gingival index with fennel mouthwash. This shows that fennel possess anti-inflammatory properties. On intergroup comparison over a period of 14 days, the mean PI difference from baseline to 7 days and baseline to 14 days were statistically significant in both the groups. Thus, the results of both the groups were comparable. The taste of fennel mouthwash was acceptable by all the subjects and there were no adverse effects reported.

As this was a pilot study further studies with a larger sample size should be carried out to evaluate anti-inflammatory properties of fennel mouthwash and its usefulness in the treatment of gingivitis. Qualitative microbial analysis was not carried out to assess the exact alterations in the periodontal pathogens following treatment.

CONCLUSIONS

Within the limits of the study, it can be concluded that fennel mouthwash and chlorhexidine mouthwash resulted in reduction of gingival index when used as an adjunct to scaling and polishing in treatment of chronic gingivitis. No adverse effects in the form of allergic reactions and/or oral lesions were reported with the use of fennel mouthwash.

Future Perspectives

Further long term, multi-center, prospective, longitudinal, randomized control trials are needed to assess whether fennel will provide additional benefits to periodontal treatment. Substantivity of fennel mouthwash needs to be further studied. The effect of fennel mouthwash on putative periodontal pathogens should be analyzed.

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