ORIGINAL ARTICLE

Comparative Evaluation of 0.1% Turmeric Mouthwash with 0.2% Chlorhexidine Gluconate in Prevention of Plaque and Gingivitis: A Clinical Study

[1]Divya Nagunuri, [2]GA Babitha, [3]Shobha Prakash

ABSTRACT

Introduction: Dental plaque has been proved by extensive research to be a paramount factor in initiation and progression of gingival and periodontal diseases. Among chemical means, chlorhexidine mouthwash is regarded as the gold standard in dentistry in prevention of dental plaque. Chlorhexidine mouthwash, though effective, has certain side effects, such as brown discoloration of teeth, oral mucosal erosion, etc. Hence, there is need of an alternative medicine enmeshed within precious traditional Indian herbal therapy which is efficient, safe, and economical. Turmeric possesses anti-inflammatory, antioxidant, antimicrobial properties along with hepatoprotective, immune stimulant, antiseptic, antimutagenic properties, etc.

Objectives: This study was conducted to explore and prove the clinical efficacy of 0.1% turmeric mouthwash in mild and moderate gingivitis patients.

Materials and methods: Sixty patients with moderate gingivitis were included and divided into two equal groups: Experimental (0.1% turmeric mouthwash) and control group (0.2% chlorhexidine gluconate). The clinical parameters evaluation was done on day 0 and day 21.

Results: On intragroup comparison, statistically significant reduction in clinical parameters (plaque index, gingival index, gingival bleeding index) was seen in both groups on day 21, but on intergroup comparison, no statistically significant reduction in clinical parameters was seen on day 21 between the groups.

Conclusion: Hence, it can be concluded that 0.1% turmeric mouthwash possesses antiplaque and anti-inflammatory properties which has been proven through clinical evaluation and it was almost equally effective when compared with 0.2% chlorhexidine gluconate mouthwash in moderate gingivitis patients.

Keywords: Chlorhexidine, Dental plaque, Dental plaque index, Gingivitis, Gluconates.

[1]Postgraduate Student, [2]Professor, [3]Professor and Head

[1-3]Department of Periodontics, College of Dental Sciences Davangere, Karnataka, India

Corresponding Author: Divya Nagunuri, Postgraduate Student Department of Periodontics, College of Dental Sciences Davangere, Karnataka, India, Phone: +918277070394, e-mail: diiivv@gmail.com

INTRODUCTION

Dental plaque has been proven by extensive research to be a paramount factor in initiation and progression of gingival and periodontal diseases. Plaque reduction has been the hallmark of preventive dentistry since the advent of antibiotics and realization that bacteria are possible causative agents of major dental diseases: Caries and periodontal disease.[1]

Van Dyke defined gingivitis as the "marginal inflammation of the gingiva comprising an inflammatory cell infiltrate, reversible destruction of collagen, and the clinical appearance of redness and swelling."[2] Plaque-induced gingivitis begins at the gingival margin and the virulent pathogens can progress throughout the gingival unit.[3,4] Inflammation is the key to the progression from gingivitis to periodontal disease, particularly when gingival inflammation transits to an exaggerated inflammatory host immune response.[5]

Kornman states that there are three ways to treat or prevent gingivitis:
1. Elimination of all clinically detectable plaque
2. Reduction of plaque below the individual's threshold for disease; and/or
3. Alteration of the microbial succession in supragingival plaque.[4]

The most rational methodology toward the prevention of periodontal diseases would be a regular and effective removal of plaque by the personal oral hygiene control. Procedures for plaque control include mechanical and chemical means. Mechanical means include brushing, flossing, use of interdental cleansing aids, and oral prophylaxis. These methods have proven to be very time-consuming and their effectiveness would depend on skills and technique of the individual carrying out the procedures.

Thus, chemical plaque control can be used as an adjunct to mechanical plaque control procedures. Recently, a number of chemical agents have been advocated which are either available in a toothpaste/dentifrice or in the form of a mouthwash. Among them, although chlorhexidine is regarded as the gold standard in prevention of dental plaque. It has been reported to originate some reversible local side effects, such as staining on teeth

and tongue, perturbation of the taste, oral mucosal erosions, and enhanced supragingival calculus deposition.

"Ayurveda" (Ayur - Life and Veda - Science), system of Indian medicine, has been used successfully for treating various systemic ailments. Turmeric, more commonly known as "haldi", possesses anti-inflammatory, antioxidant, antimicrobial properties along with hepatoprotective, immune stimulant, antiseptic, antimutagenic, and many more properties.[6,7] Thus, this study was carried out using the soluble form of turmeric (mouthwash) to evaluate its antiplaque and anti-inflammatory properties for the treatment of mild and moderate gingivitis.

MATERIALS AND METHODS

Study Population

A total of 60 subjects were selected from the Outpatient Department of Periodontics, College of Dental Sciences, Davangere, Karnataka, India. The study protocol was conducted under the guidelines prescribed by Rajiv Gandhi University of Health Sciences, Bengaluru, Karnataka, India and approved by the local ethical committee (IRB-22/2013-14) at College of Dental Sciences, Davangere, Karnataka, India. Informed consent was obtained from all the patients before the start of treatment.

SELECTION CRITERIA

Inclusion Criteria

- Subjects of age 15 years and above
- Subjects with moderate gingivitis
- Subjects having at least 20 erupted teeth

Exclusion Criteria

- Patients who are allergic to turmeric
- Patients with history of antibiotic therapy 3 months prior to the study
- Patients with history of oral prophylaxis 6 months prior to the study
- Medically compromised patients
- Patients with mouth breathing habit
- Smokers
- Pregnant and lactating women

STUDY DESIGN

A double-blind randomized controlled clinical trial was carried out. The clinical data were recorded in a case history pro forma. The following parameters were recorded at day 0 and day 21:
- Plaque index (PI) Silness and loe[8]
- Gingival index (GI) Loe and Silness[9]
- Gingival bleeding index (GBI) Ainamo and Bay[10]

Oral hygiene instructions were given and complete scaling was carried out for all the subjects. All 60 subjects were divided into two equal groups: Test group (30 patients – 0.1% turmeric mouthwash) and control group (30 patients – 0.2% chlorhexidine gluconate mouthwash).

The experimental mouthwash - 0.1% turmeric mouthwash was prepared with the help of Bapuji Pharmacy College. Its composition was: Turmeric extract 0.1% (curcumin equivalent) (Fig. 1), Peppermint oil - flavoring agent, double strength chloroform water - preservative and water q.s. (Fig. 2).

For a period of 21 days, both the groups were advised to use 10 mL of mouthwash for 1 minute twice a day and were instructed to report on the subsequent 21st day for the evaluation of subjective, objective criteria and reassessment of clinical parameters.

Statistical Analysis

Changes from baseline to different time intervals in various clinical parameters were analyzed by the paired t-test (Intragroup comparisons). Intergroup comparisons

Fig. 1: Turmeric extract

Fig. 2: 0.1% turmeric mouthwash

of posttreatment changes were analyzed by the unpaired t-test. A p < 0.05 was considered as a statistically significant difference.

RESULTS

At baseline, there was no statistically significant difference between the two groups with regards to PI, GI, and GBI (p > 0.05).

PLAQUE INDEX

The PI was reduced during the study in both groups, but no statistically significant difference was found between the two groups.

The mean PI for the test group (turmeric mouthwash) at the baseline and day 21 was 1.46 ± 0.19 and 0.94 ± 0.17 respectively. The mean reduction of PI scores from baseline - 21st day was statistically highly significant (p < 0.001). The mean PI for the control group (chlorhexidine mouthwash) at the baseline and day 21 was 1.36 ± 0.29 and 0.93 ± 0.28 respectively. The mean reduction of PI scores from baseline - 21st day was statistically highly significant (p < 0.001) (Tables 1 and 2).

GINGIVAL INDEX

The mean GI for the test group at the baseline and day 21 was 1.36 ± 0.27 and 0.85 ± 0.22 respectively. The mean reduction of PI scores from baseline - 21st day was statistically highly significant (p < 0.001). The mean GI for

the control group at the baseline and day 21 was 1.36 ± 0.27 and 0.85 ± 0.22 respectively. The mean reduction of PI scores from baseline - 21st day was statistically highly significant (p < 0.001) (Tables 1 and 2).

GINGIVAL BLEEDING INDEX

The mean GBI for the test group at the baseline and day 21 was 84.79 ± 4.27 and 47.91 ± 4.84 respectively. The mean reduction of GBI scores from baseline - 21st day was statistically highly significant (p < 0.001). The mean GBI for the control group at the baseline and day 21 was 82.35 ± 8.78 and 43.61 ± 9.86 respectively. The mean reduction of GBI scores from baseline - 21st day was statistically highly significant (p < 0.001) (Tables 1 and 2).

SUBJECTIVE CRITERIA

The turmeric mouthwash was acceptable in taste and was biocompatible (not associated with subjective signs, such as burning sensation, dryness etc.). It has been observed in this study from subjective and objective criteria that bitter taste was experienced by five subjects and dryness/soreness was experienced by two subjects in the control group (Table 3).

OBJECTIVE CRITERIA

Transient staining of the tongue was observed in two subjects using turmeric mouthwash and staining of teeth was observed in three subjects using chlorhexidine mouthwash (Table 4).

Table 1: Intragroup comparison of clinical parameters at different time intervals

Clinical parameter		Test group	p-value	Control group	p-value
Plaque index	Day 0	1.46 ± 0.19	p = 0 (HS)	1.36 ± 0.29	p = 0 (HS)
	Day 21	0.94 ± 0.17		0.93 ± 0.28	
Gingival index	Day 0	1.36 ± 0.27	p = 0 (HS)	1.34 ± 0.29	p = 0 (HS)
	Day 21	0.85 ± 0.22		0.88 ± 0.28	
Gingival bleeding index	Day 0	84.79 ± 4.27	p = 0 (HS)	82.35 ± 8.78	p = 0 (HS)
	Day 21	47.91 ± 4.84		43.61 ± 9.86	

p < 0.05: Significant; p < 0.001; HS: Highly significant

Table 2: Intergroup comparison of clinical parameters at different time intervals

Clinical parameters	Plaque index		Gingival index		Gingival bleeding index	
	Day 0	Day 21	Day 0	Day 21	Day 0	Day 21
Test	1.46 ± 0.19	0.94 ± 0.17	1.36 ± 0.27	0.85 ± 0.22	84.79 ± 4.27	47.91 ± 4.84
Control	1.36 ± 0.29	0.93 ± 0.28	1.34 ± 0.29	0.88 ± 0.28	82.35 ± 8.78	43.61 ± 9.86
p-value	p = 0.125 NS	p = 0.979 NS	p = 0.802 NS	p = 0.638 NS	p = 0.17 NS	p = 0.06 NS

NS: Non significant

Table 3: Intergroup comparison of subjective criteria for adverse effects

Group	Taste acceptability			Burning sensation		Dryness/Soreness	
	Acceptable	Tolerable	Unacceptable	Absent	Present	Absent	Present
Test	30	0	0	30	0	30	0
Control	25	0	5	30	0	28	2

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Table 4: Intergroup comparison of objective criteria for adverse effects

Group	Ulcer formation		Staining of teeth		Staining of tongue		Allergy		Bitter taste	
	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present
Test	30	0	30	0	28	2	30	0	30	
Control	30	0	27	3	30	0	30	0	25	5

DISCUSSION

Dental plaque plays a major role in the etiology of periodontal disease and there is a direct relationship between the presence of dental plaque and the development of gingivitis.[11] Disturbing plaque accumulation is of major importance, thus periodontal nonsurgical and surgical therapy aims at reducing or eliminating supra and subgingival plaque and establishing conditions which will allow effective self-performed plaque control.[12] Majority of the population may not perform mechanical plaque removal sufficiently or they may lack the dexterity, skill and motivation for mechanical plaque removal. Thus, antimicrobial mouthrinses that augment daily home care may provide an effective means of removing or controlling bacterial plaque to limit gingivitis and periodontitis.[13]

Chlorhexidine has been regarded as a "gold" standard in dentistry for the prevention of plaque and gingivitis. Chlorhexidine mouthwash, though effective, also has certain side effects, such as brown discoloration of teeth, oral mucosal erosion, and bitter taste.[14,15]

Natural compounds can act in a synergetic manner within the human body, and can provide unique therapeutic properties with minimum or no undesirable side effects.[16] Turmeric has been attributed a number of medicinal properties in the traditional system of medicine. Turmeric (haldi), a rhizome of Curcuma longa, is a flavorful yellow-orange spice. Components of turmeric are named curcuminoids, which include mainly curcumin (diferuloyl methane), demethoxycurcumin, and bisdemethoxycurcumin. The best-researched active constituent is curcumin which comprises 0.3 to 5.4% of raw turmeric.

As a natural product, turmeric (curcumin) is nontoxic and has diversified effects in various oral diseases.[17] Thus, this study was conducted to evaluate the efficacy of 1% turmeric mouthwash on dental plaque and gingival inflammation and to compare the efficacy of 0.2% chlorhexidine gluconate and 0.1% turmeric mouthwash in prevention of plaque and gingivitis.

The reduction of PI values from baseline to day 21 signifies the antiplaque property of 0.1% turmeric mouthwash which is similar to that of results of the study conducted by Waghmare et al[7] to compare the efficacy of turmeric mouthwash and chlorhexidine gluconate mouthwash in prevention of gingivitis and plaque formation.[10]

The reduction of GI and GBI values from baseline to day 21 signifies the anti-inflammatory property of turmeric which has also been observed in various studies carried out by Srimal et al,[18] Ghatak and Basu,[19] Waghmare et al,[7] Mali et al,[20] etc.

After evaluation of subjective and objective criteria, it was found that the turmeric mouthwash is free from the side effects, such as bitter taste, dryness/soreness, and staining of teeth which occur with the chlorhexidine mouthwash. Staining of tongue was observed in two subjects using turmeric mouthwash, however it was transient. Chlorhexidine has reported many local and systemic side effects on long-term use, including staining of teeth, taste perturbation, oral mucosal erosions, parotid swelling, and enhanced rate of calculus formation, but there were no significant side effects found in soft and hard tissues of the mouth in any studies assessing 0.1% turmeric mouthwash.[21] Safety evaluation studies have indicated that both turmeric and curcumin are well-tolerated at a very high dose without any toxic effects.[22]

The possible shortcomings of this study are the smaller sample size and the duration of the study is short. Therefore, further clinical trials with larger sample size and longer reevaluation periods are required to evaluate better the efficacy of 0.1% turmeric mouthwash against gingivitis.

CONCLUSION

This study highlighted the anti-plaque and anti-inflammatory properties of 0.1% turmeric mouthwash and comparative efficacy of 0.1% turmeric mouthwash and chlorhexidine (0.2%) mouthwash in mild to moderate gingivitis through clinical analysis.

Results showed a consistent reduction in plaque score, gingival score, and gingival bleeding scores at different time intervals between baseline to 3 weeks in each group. Hence, from this study, it can be concluded that 0.1% turmeric mouthwash possess anti-plaque and anti-inflammatory properties which has been proven through clinical evaluation and it was almost equally effective when compared with 0.2% chlorhexidine gluconate mouthwash in prevention of plaque in mild to moderate gingivitis patients.

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