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

Divya Nagunuri et al

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.

How to cite this article: Nagunuri D, Babitha GA, Prakash S. Comparative Evaluation of 0.1% Turmeric Mouthwash with 0.2% Chlorhexidine Gluconate in Prevention of Plaque and Gingivitis: A Clinical Study. CODS J Dent 2016;8(1):16-20.

Source of support: Nil

Conflict of interest: None
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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, antimitagenic, and many more properties. 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
- Gingival index (GI) Loe and Silness
- Gingival bleeding index (GBI) Ainamo and Bay

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...
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 $1.46 \pm 0.19$ and $0.94 \pm 0.17$ 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 $1.36 \pm 0.29$ and $0.93 \pm 0.28$ 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 $1.36 \pm 0.27$ and $0.85 \pm 0.22$ respectively. The mean reduction of GI 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 $1.34 \pm 0.29$ and $0.88 \pm 0.28$ respectively. The mean reduction of GI 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 $84.79 \pm 4.27$ and $47.91 \pm 4.84$ 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 $82.35 \pm 8.78$ and $43.61 \pm 9.86$ 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).

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

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

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

<table>
<thead>
<tr>
<th>Clinical parameters</th>
<th>Plaque index</th>
<th>Gingival index</th>
<th>Gingival bleeding index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day 0</td>
<td>Day 21</td>
<td>Day 0</td>
</tr>
<tr>
<td>Test</td>
<td>1.46 ± 0.19</td>
<td>0.94 ± 0.17</td>
<td>1.36 ± 0.27</td>
</tr>
<tr>
<td>Control</td>
<td>1.36 ± 0.29</td>
<td>0.93 ± 0.28</td>
<td>1.34 ± 0.29</td>
</tr>
<tr>
<td>p-value</td>
<td>p = 0.125 NS</td>
<td>p = 0.979 NS</td>
<td>p = 0.802 NS</td>
</tr>
</tbody>
</table>

NS: Non significant

**Table 3:** Intergroup comparison of subjective criteria for adverse effects

<table>
<thead>
<tr>
<th>Group</th>
<th>Taste acceptability</th>
<th>Burning sensation</th>
<th>Dryness/Soreness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acceptable</td>
<td>Tolerable</td>
<td>Unacceptable</td>
</tr>
<tr>
<td>Test</td>
<td>30</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Control</td>
<td>25</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>
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Cine. 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. 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.

Table 4: Intergroup comparison of objective criteria for adverse effects

<table>
<thead>
<tr>
<th>Group</th>
<th>Ulcer formation Absent</th>
<th>Staining of teeth Absent</th>
<th>Staining of tongue Absent</th>
<th>Allergy Absent</th>
<th>Bitter taste Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td>30 0</td>
<td>28 2</td>
<td>30 0</td>
<td>30 0</td>
<td>25 5</td>
</tr>
<tr>
<td>Control</td>
<td>30 0</td>
<td>27 3</td>
<td>30 0</td>
<td>30 0</td>
<td>25 5</td>
</tr>
</tbody>
</table>

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. 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. 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.

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.

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. 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.

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, Ghatak and Basu, Waghmare et al, Mali et al, 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.

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.

REFERENCES


