Evaluating the properties of two herbal mouthwashes and their effect on total leukocyte count after Phase I therapy

Monica Lamba, Aditya Sinha, K. D. Jithendra, Amrinder Singh, Ashish Singh

Department of Periodontics, KD Dental College & Hospital, Mathura, Uttar Pradesh, India

Abstract

Introduction: Periodontal diseases are among the most common infectious diseases affecting human kind and can lead to destruction of the periodontal ligament, cementum, gingiva, and alveolar bone. Plaque is the main etiological cause for gingival inflammation. Since a greater part of population is not able to perform plaque control effectively, the onus lies on the dental health care provider to impart the correct knowledge about the oral hygiene aids and adjunctive use of various plaque control agents.

Materials and Methods: A total of 60 patients aged between 30 to 45 years with chronic generalized periodontitis with previously untreated periodontitis were recruited from the Department of Periodontics and oral Implantology, K.D. dental college and hospital, Mathura, India.

Scaling and root planning was done in single sitting for all the groups. Clinical parameters: Silness and Loe plaque index, Loe and Silness gingival index and Russell’s periodontal index were recorded at pretreatment/baseline, at 2 weeks, 3 weeks and 4 weeks after SRP. Blood was collected from median cubital vein in vacutainer and was send to laboratory and TLC was measured at baseline and after 4 weeks of Phase I therapy.

Study groups:

Group I: 20 patients given commercially available preformulated Colgate plax Green Tea mouthwash
Group II: 20 patients given commercially available preformulated Colgate plax Mint mouthwash
Group III: 20 patients given saline rinse

Result: 60 adult patients with previously untreated chronic generalized periodontitis were selected on the basis of inclusion and exclusion criterias. After the statistical analysis using paired t test there was significant reduction in the plaque score was observed with both the mouthwashes but to a greater extent in patients who used green tea mouthwash for one month.

Conclusion: Herbal mouthwashes are valuable in the treatment of periodontal diseases by reducing the inflammation. The present study suggest that there is a significant reduction seen in the plaque, gingival & periodontal scores with both the mouthwashes but green tea mouthwash proved to be more beneficial than mint mouthwash with modest reduction in the TLC count. Herbal products have shown promising results with minimal side effects.
Comparing two herbal mouthwashes

Lamba, et al.

including interproximal surfaces. Chlorhexidine is regarded as a gold standard mouthwash, but has significant side-effects, apart from staining of teeth after long term use, like contact dermatitis, IgE mediated hypersensitivity. Recently, numerous studies have been conducted to verify the enormous wealth of medicinal plants.

Due the destructive nature of the periodontal disease plethora of systemic markers of this condition have been reported and speculate to contribute to systemic diseases. Advancement in understanding the pathogenesis of periodontal diseases has paved the way for new approaches in prevention, diagnosis, treatment, and prognosis causing transient bacteremia, thus increase in the number of leukocytes is attributed to the increase mainly of polymorphonuclear neutrophils which are key participants in the periodontal lesion. It has also been shown that this increase in leukocytes is aggravated by increasing severity and extent of disease and periodontal therapy may lead to a decrease in the number of leukocytes. The total number of leukocyte in the peripheral blood is a diagnostic measure of infection or inflammatory disease.

Materials and Methods

A total of 60 patients aged between 30 and 45 years with chronic generalized periodontitis with previously untreated periodontitis were recruited from the Department of Periodontics and oral Implantology, K.D. Dental College and Hospital, Mathura, India.

Procedure

Scaling and root planning were done in single sitting for all the groups. Clinical parameters; Silness and Loe plaque index, Loe and Silness gingival index and Russell’s periodontal index were recorded at pretreatment/baseline, at 2 weeks, 3 weeks, and 4 weeks after scaling and root planning. Blood was collected from a median cubital vein in vacutainer and was sent to the laboratory and total leucocyte count (TLC) was measured at baseline and after 4 weeks of Phase I therapy.

Study groups

Group I: 20 patients given commercially available preformulated Colgate plax Green Tea mouthwash

Group II: 20 patients given commercially available preformulated Colgate plax Mint mouthwash

Group III: 20 patients given saline rinse

Inclusion criteria for the patients to participate in this study:

• Age between 30 and 45 years

• Patients with chronic generalized periodontitis

Exclusion criteria:

• Patients with systemic disease

• Previous history of antibiotics (6 months)

Table 1: Mean difference table of PI

<table>
<thead>
<tr>
<th>PI duration</th>
<th>Green tea mouthwash</th>
<th>Mint mouthwash</th>
<th>Saline (placebo)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean difference</td>
<td>SD difference</td>
<td>Mean difference</td>
</tr>
<tr>
<td>Baseline - after 2 weeks</td>
<td>0.71</td>
<td>0.21</td>
<td>0.14</td>
</tr>
<tr>
<td>Baseline - after 3 weeks</td>
<td>1.39</td>
<td>0.00</td>
<td>0.4</td>
</tr>
<tr>
<td>Baseline - after 4 weeks</td>
<td>1.84</td>
<td>0.03</td>
<td>0.72</td>
</tr>
</tbody>
</table>

PI: Plaque index, SD: Standard deviation

Table 2: Mean difference table of GI

<table>
<thead>
<tr>
<th>GI duration</th>
<th>Green tea mouthwash</th>
<th>Mint mouthwash</th>
<th>Saline (placebo)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean difference</td>
<td>SD difference</td>
<td>Mean difference</td>
</tr>
<tr>
<td>Baseline - after 2 weeks</td>
<td>0.40</td>
<td>0.01</td>
<td>0.17</td>
</tr>
<tr>
<td>Baseline - after 3 weeks</td>
<td>0.78</td>
<td>−0.02</td>
<td>0.36</td>
</tr>
<tr>
<td>Baseline - after 4 weeks</td>
<td>1.30</td>
<td>−0.24</td>
<td>0.57</td>
</tr>
</tbody>
</table>

GI: Gingival index, SD: Standard deviation

Table 3: Mean difference table of RPI

<table>
<thead>
<tr>
<th>RPI duration</th>
<th>Green tea mouthwash</th>
<th>Mint mouthwash</th>
<th>Saline (placebo)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean difference</td>
<td>SD difference</td>
<td>Mean difference</td>
</tr>
<tr>
<td>Baseline - after 2 weeks</td>
<td>0.47</td>
<td>−0.07</td>
<td>0.05</td>
</tr>
<tr>
<td>Baseline - after 3 weeks</td>
<td>0.93</td>
<td>−0.01</td>
<td>0.21</td>
</tr>
<tr>
<td>Baseline - after 4 weeks</td>
<td>1.10</td>
<td>−0.12</td>
<td>0.36</td>
</tr>
</tbody>
</table>

RPI: Russell’s periodontal index, SD: Standard deviation
Comparing two herbal mouthwashes

Table 4: Mean difference table of TLC

<table>
<thead>
<tr>
<th>TLC in thousand/mm³ duration</th>
<th>Green tea mouthwash Mean difference</th>
<th>Green tea mouthwash SD difference</th>
<th>Mint mouthwash Mean difference</th>
<th>Mint mouthwash SD difference</th>
<th>Saline (placebo) Mean difference</th>
<th>Saline (placebo) SD difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline - after 4 weeks</td>
<td>0.67</td>
<td>−0.03</td>
<td>0.41</td>
<td>−0.08</td>
<td>0.37</td>
<td>0.10</td>
</tr>
</tbody>
</table>

TLC: Total leucocyte count, SD: Standard deviation

Table 5: Mean comparison of green tea mouthwash and saline groups

<table>
<thead>
<tr>
<th>TLC in thousand/mm³ duration</th>
<th>Green tea mouthwash Mean difference</th>
<th>Green tea mouthwash SD difference</th>
<th>Saline (placebo) Mean difference</th>
<th>Saline (placebo) SD difference</th>
<th>t value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline - after 4 weeks</td>
<td>0.67</td>
<td>−0.03</td>
<td>0.37</td>
<td>0.10</td>
<td>3.538</td>
<td>0.002 S</td>
</tr>
</tbody>
</table>

Statistical analysis: Unpaired *t*-test. Statistically significant if *P*<0.05. S: Significant

Table 6: Mean comparison of mint mouthwash and saline groups

<table>
<thead>
<tr>
<th>TLC in thousand/mm³ duration</th>
<th>Mint mouthwash Mean difference</th>
<th>Mint mouthwash SD difference</th>
<th>Saline (placebo) Mean difference</th>
<th>Saline (placebo) SD difference</th>
<th>t value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline - after 4 weeks</td>
<td>0.41</td>
<td>−0.08</td>
<td>0.37</td>
<td>0.10</td>
<td>0.467</td>
<td>0.646 NS</td>
</tr>
</tbody>
</table>

Statistical analysis: Unpaired *t*-test. Statistically significant if *P*<0.05. NS: Not significant

Graph 1: Plaque index

Graph 2: Gingival index
Comparing two herbal mouthwashes

Lamba, et al.

- Smokers
- Pregnant women
- Patient using any other form of mouthwash

Results

A total of 60 adult patients with previously untreated chronic generalized periodontitis were selected on the basis of inclusion and exclusion criteria’s. After the statistical analysis using paired t test, there was a significant reduction in the plaque score was observed with both the mouthwashes, but to a greater extent in patients who used green tea mouthwash for 1-month. Tables 1 and 2 show a significant reduction in plaque scores and gingival scores respectively with $P < 0.001$ for green tea mouthwash and mint mouthwash, but a greater percentage of change was observed with green tea mouthwash. Table 3 shows a significant reduction in probing pocket depth with both the mouthwashes but greater difference observed with green tea mouthwash.

Table 4 shows a significant increase in total leukocyte count after Phase I therapy and using green tea mouthwash with $P$ value (0.002) when statistically analyzed using unpaired t-test whereas on the other hand TLC increase was not seen to increase significantly with mint mouthwash. Table 5 shows an elaborated significant result with green tea mouthwash and Table 6 shows an elaborated non-significant result with mint mouthwash.

Graphs 1-4 depict a reduction in mean values of plaque scores, gingival scores, periodontal scores, and TLC, respectively is more in patients who used green tea mouthwash for 1-month as compared to those who used mint mouthwash after Phase I therapy.

Discussion

Herbal mouthwashes are gaining popularity as they contain naturally occurring ingredients called as Phytochemicals that achieve the desired antimicrobial and anti-inflammatory
effects.[2] These formulations may be more appealing because they work without alcohol, artificial preservatives, flavors or colors.

Green tea, *Camellia sinensis* from the family of *Thea Cease* is mostly cultivated in coasts of Caspian sea in North of Iran. Green tea extracts and several green tea polyphenols have been reported to kill many types of cancer cells as well. Epigallocatechin gallate (EGCG) also decreases the production of the T-lymphocyte growth factor interleukin-2.[3]

Several properties including antioxidant, anticaries, antibacterial, antiviral, anti-diabetic, antimutagenic, and antitumoral properties are addressed for green tea. Its beneficial effects are associated with the polyphenol contents comprising catechin (C), epicatechin, gallocatechin, epigallocatechin (EGC), epicatechin gallate (ECG), and EGCG.[4]

Catechin contents specially, ECG, EGCG within green tea inhibits peptidase, and collagenase activity. Otake et al. suggested that green tea has an antiplaque effect due to the polyphenolic compositions and tannin compounds. A small amount of tannin and vitamin K within green tea may also improve bleeding index.[5]

Mint is a health promising herb belonging to family Lamiaceae. Mint is known as *Mentha rotundifolia* L. It is an effective anti-malodor plant if used as mouthwash as it counteracts the volatile sulfur compounds responsible for halitosis. The leaves of *Mentha* have anti-oxidant properties and can be used as extracts in mouthwashes. The essential oil of mint has antiseptic properties.[6]

There was a significant reduction seen in the plaque, gingival, and periodontal scores with both the mouthwashes, but green tea mouthwash proved to be more beneficial than mint mouthwash that is probably due to the anti-oxidant property present in green tea. The patient did not complain of any alteration in taste sensation and no visible staining was observed on the dentition which was an added advantage when compared to chlorhexidine based formulation mouthwashes.

Green tea mouthwash has managed to reduce the TLC count especially on the neutrophil count, this might be attributed to the anti-inflammatory and antioxidant property associated with it.[7] Further researches are needed to check its effect on specific markers of inflammation associated with periodontal diseases.

**Conclusion**

Herbal mouthwashes are valuable in the treatment of periodontal diseases by reducing the inflammation.[8] The present study suggest that there is a significant reduction seen in the plaque, gingival & periodontal scores with both the mouthwashes but green tea mouthwash proved to be more beneficial than mint mouthwash with modest reduction in the TLC count. Herbal products have shown promising results with minimal side effects. Green tea mouthwash is beneficial to cure or prevent periodontal disease due to the presence of catechin and epigallocatechin; these derivatives inhibit various periodontal pathogens.[9] Hence further research and long term clinical trials are required to evaluate its effectiveness both orally and systemically.

**References**
