

The effect of topical application of red betel (*piper crocatum*) leaf gel on clinical attachment level to treat patients with chronic periodontitis



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Abstract

Objective: The purpose of this study is to determine the effect of red betel (*piper crocatum*) leaf gel as adjunctive therapy of scaling and root planning to the clinical attachment level (CAL) repair in the treatment of chronic periodontitis.

Material and Methods: This study was conducted using randomized control trial, single-blind, split-mouth method before and after treatment. The study participants were 18 patients afflicted with chronic periodontitis and aged between 30 and 62 years. During the study, the jaws of the subjects were divided into two sides for test and control. Although both sides were treated for scaling and root

planning, the side for the test was given additional topical application of red betel leaf gel. The evaluation of CAL was performed 1 month after the treatment. The data were statistically analyzed using the paired *t* test for comparison before and after treatment on each side and the unpaired *t* test to compare the test and control side.

Results: Improvement of CAL in the test side is better than the control side, while distobuccal test side showed the greatest improvement by 31.4%.

Conclusion: Topical application of red betel leaf gel in patients with chronic periodontitis can increase the clinical attachment level.

Keywords: Chronic periodontitis, Clinical attachment, Gel, Red betel, Topical applications

Cite this Article: Herryawan. 2017. The effect of topical application of red betel (*piper crocatum*) leaf gel on clinical attachment level to treat patients with chronic periodontitis. *Journal of Dentomaxillofacial Science* 2(3): 160-163. DOI: [10.15562/jdmfs.v2i3.649](https://doi.org/10.15562/jdmfs.v2i3.649)

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Introduction

Chronic periodontitis is the most common form of periodontitis associated with the accumulation of plaque and calculus. Generally, it has a slow rate of progression and causes moderate periodontal tissue damage, although a more rapid period of destruction may occur. Increased development of chronic periodontitis may be caused by the impact of local factors, including systemic or environmental factors, affecting the normal interaction between host and bacteria.¹

Scaling and root planning are an integral and fundamental mechanical procedure critical to the success of all periodontal treatments. The treatment is done by removing plaque, calculus, endotoxins, and also necrotic cementum on the root surface to get the root surface biologically acceptable, reducing pocket depth, clinical attachment level repair, as well as preparing the gingival tissue for surgical treatment.^{2,3} However, sometimes the retention of plaque is persists in remote locations during the treatment. This could create a space for reestablished infection due to the growth of microflora and cause periodontal disease. Therefore, pharmacotherapeutic agents are used as additional methods for periodontal diseases prevention.^{4,5}

Use of pharmacotherapeutic agents as an adjunctive therapy in controlling periodontitis

is categorized based on the type of administration used, that is, whether local or systemic.^{3,4} The potential risks associated with systemically antibiotic therapy include bacterial resistance, emergence of opportunistic infections and the possibility of allergies, while the long-term administration of NSAIDs may also have harmful effects such as indigestion and bleeding, kidney and liver damage, central nerve system disorders, inhibition of platelet aggregation, prolonged bleeding time, bone marrow damage and hypersensitivity reactions.³ Local antibiotics are shown to provide some benefits, such as delivering the drug to the area of disease activity at concentrations of bactericide and allowing long-term administration of drugs. The administration of chemotherapeutic agents in a controlled manner into the periodontal pocket can alter the flora pathogens and improve clinical signs of periodontitis.³⁻⁶ Some of antibacterial agents applied locally include acrylic strips, and fiber and gel formulations. The use of gel itself has been proven to be more efficient and effective, as it does not need to be removed or repeated.⁷

Today, the popularity of herbal therapy is on the rise. One of the herbs that are empirically used as traditional medicine is red betel (*piper crocatum*). This plant is widely known as an ornamental plant

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Received: 21 February 2017
Revised: 9 October 2017
Accepted: 16 October 2017
Available online: 1 December 2017

that grows vines on the fence or tree. Several studies have been conducted to reveal the benefits of red betel and show that red betel leaves contain essential oils that have antibacterial properties.⁸ In addition to essential oils, red betel leaf also has beneficial chemical compounds such as alkaloids, saponins, tannins and flavonoids that have antibacterial and anti-inflammatory properties.^{9,10}

In regard to the above mentioned benefits, efficiency and efficacy,⁷ the writer is interested to examine the effect of topical application of red betel leaf gel as a supporting treatment for scaling and root planning in patients with chronic periodontitis,³⁻⁶ based on the parameter of clinical attachment level (CAL) before and after treatment.

Material and methods

The study used red betel leaves taken from the red betel plant that grows in Bandung. The red betel leaf gel was manufactured in the Laboratory of Pharmacy Faculty of Science Jenderal Achmad Yani University Cimahi Indonesia. There are two phases in preparing the red betel leaf gel: a. Preparing the dried extract of red betel leaf and b.

preparing the red betel leaf gel [figure 1](#) so that every 10 grams of the resultant gel contains 10% of red betel leaves.

The study used a randomized controlled trial, single-blind, split-mouth method before and after treatment,¹² and involved the trial of 18 patients with chronic periodontitis who came to the Clinic of Periodontal Unjani Cimahi between September and December 2016. These participants were selected purposively. The inclusion criteria for the participants of this study were men and women aged ≥ 30 years who suffered from chronic periodontitis on at least two opposite jaw sides,^{12,13} while those with a history of systemic diseases, smoker, past periodontal treatment of at least 6 months prior to the study, taking the antibiotic at least 3 months prior to the study, and wearing dentures also fixed orthodontic appliance were excluded from the study.¹⁴⁻¹⁷

The study was conducted after obtaining approval from the ethics committee. Patients who were eligible for the study were first asked to sign an informed consent form. Their jaws were then divided into two sides. One side for the test area that was treated with scaling and root planning and also topical application of red betel leaf gel and the other side, that is, the control side, was given scaling and root planning treatments only [figure 2](#).¹² During the study, the red betel leaf gel was applied to the bottom of the pocket until it overflowed to the gingival margin and left for a few moments before the excess gel was cleaned with cotton. Subjects were instructed not to eat, drink, or rinse for 1 hour after treatment.^{4,5} They were also instructed to maintain their daily oral hygiene routine.

Measurement of CAL was recorded at the baseline and 1 month after the treatment. A week after treatment, during a control visit, researcher reapplied red betel leaf gel on the test side.^{4,5} Data analysis using paired *t* test was conducted to measure CAL changes before and after treatment on each side, while the unpaired T-test was performed to compare the test and control side, with a 95% confidence level.¹⁸

Results

Characteristics of Sample

[Table 1](#) shows that 18 patients aged between 30 and 62 years with chronic periodontitis participated in the study. Most respondents were male (5 or 27.7% from the total number of samples) and were in the age group of 50–59 years.

Clinical Attachment Level

[Table 2](#) shows that the improvement of CAL is significant in all surfaces, except on the buccal and mesiobuccal areas of the control side. CAL significantly improved, by as much as 31.4%, on the test



Figure 1 Red betel leaf gel has been placed in a syringe



Figure 2 Application of red betel leaf gel into the periodontal pocket

Table 1 Characteristics of sample

Age Range	Sex	
	Male	Female
30 - 39	3 (16.6 %)	1 (5.5 %)
40 - 49	1 (5.5 %)	2 (11.1 %)
50 - 59	5 (27.7 %)	2 (11.1 %)
60 - 69	2 (11.1 %)	2 (11.1 %)

Table 2 Average value of CAL before and after treatment

Surface Side		CAL			P-Value
		Before	After	Difference	
Distobuccal	Test	6.17	4.22	1.94 (31.4%)	0.000*
	Control	6.11	5.56	0.56 (9.2%)	0.006*
Buccal	Test	4.28	3.33	0.94 (22.0%)	0.000*
	Control	4.06	3.78	0.28 (6.9%)	0.311
Mesiobuccal	Test	6.00	4.72	1.28 (21.3%)	0.000*
	Control	5.50	5.17	0.33 (6.0%)	0.131
Distolingual	Test	6.22	4.83	1.38 (22.2%)	0.000*
	Control	5.89	5.22	0.67 (11.4%)	0.012*
Lingual	Test	5.06	4.06	1.22 (24.1%)	0.002*
	Control	4.83	4.33	0.50 (10.4%)	0.007*
Mesiolingual	Test	5.83	4.44	1.33 (22.8%)	0.000*
	Control	5.22	4.78	0.44 (8.2%)	0.046*

* significant (p<0.05).

Table 3 Average differences of CAL before and after treatment

Surface	CAL			P-Value
	Test Side	Control Side	Difference	
Distobuccal	1.94	0.56	1.38 (74.2%)	0.001*
Buccal	0.94	0.28	0.66 (70.2%)	0.002*
Mesiobuccal	1.28	0.33	0.95 (71.1%)	0.001*
Distolingual	1.38	0.67	0.71 (51.4%)	0.016*
Lingual	1.22	0.50	0.72 (59.0%)	0.010*
Mesiolingual	1.33	0.44	0.89 (66.9%)	0.004*

* significant (p<0.05).

side on the distobuccal, while CAL's improvement on the control side only reached 11.4% on the distolingual region.

Table 3 shows that there is a significant difference in CAL before and after treatment on both sides and in all surfaces. The largest difference occurred on the distobuccal region, which reached as much as 74.2%.

Discussion

The study subjects were in the age range of 30-62 years, which is a primary evidence for the

theory that chronic periodontitis mostly affects adults only.^{1,10} Results show that there is improvement of CAL on both sides, which was observed in the case of all respondents who received initial periodontal treatments such as scaling and root planning. The initial treatment itself was aimed at eliminating as much as possible the etiologic factor in the form of microbes or other factors causing periodontal disease, so as to stop the progression of the disease and repair the periodontal tissues for a healthy mouth.^{13,19} This kind of treatment is also done for controlling the bacteria that cause periodontal abnormalities and local risk factors and also for minimizing the potential impact of systemic factors. Changes in microflora after scaling and root planning are usually accompanied by changes in the measurement of clinical periodontal tissue.¹⁹ Several clinical trials have consistently shown that scaling and root planning will reduce gingival inflammation and probe depth and that it will also improve CAL in most patients with periodontal diseases.^{2,3}

Comparison of changes on the buccal and mesiobuccal regions of the control side before and after treatment showed that there was no significant improvement. This result may have been caused by several things, such as remote tooth's surface, the difference in the operator's ability to scaling and root planning, as well as the possibility of bacterial invasion into the soft tissue or dentin tubules. In this case, mechanical therapy cannot treat all subgingival deposits or reach the bacteria that may have attacked soft tissue or dentin tubules. The low improvement may also be a result of a re-colonization of pathogenic bacteria originating from non-dental area^{4,5,13} in the treated region. As for the test side, compared to the control side, there was a significant improvement in all surfaces, both before and after treatment. This result was due to the application of red betel leaf gel, which has antibacterial and anti-inflammatory effects, on the test side, as an adjunct of initial treatment. Local application of antibacterial agent can be chosen as an adjunct to initial therapy to control the growth of bacteria on the membrane barrier. When placed into the periodontal pocket, the agent will be able to reduce the amount of subgingival microflora, pocket depth, and clinical signs of inflammation, while local additional therapy will result in better CAL than is possible with scaling and root planning only.^{4,13} The administration of antibacterial agents locally can be used as an adjunct therapy to conventional mechanical therapy. In the case of periodontitis, an antibacterial agent that is applied locally to the subgingival would be

very useful for treating patients who have a pocket depth of 5 mm or more, bleeding on probing and also who are unresponsive to primary therapy, including scaling and root planing.

Conclusion

The topical application of red betel leaf gel after scaling and root planning in patients with chronic periodontitis enhances the clinical attachment level better than the treatment option of using scaling and root planing only.

Conflict of Interest

The author report no conflict of interest.

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