

## THE EFFECTIVENESS OF RINSING WITH CELERY LEAFS (*APIUM GRAVEOLENS L.*) EXTRACT 10% AND CHLORHEXIDINE GLUCONATE 0.1% TO ACCELERATE POST-SCALING GINGIVITIS HEALING

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### ABSTRACT

**Background:** Gingivitis is a periodontal disease caused by accumulation of bacteria plaque on the tooth surface. The primary treatment of gingivitis by removing its etiologic factors that found in phase I of periodontal therapy is scaling and plaque control. Healing process of gingivitis takes time, therefore sometimes using antimicrobial and antiinflammatory drugs as an adjunctive therapy is needed. The use of celery extract as mouthwash containing flavonoid (apiin and apigenin) works as antibacterial and antiinflammatory agent. The purpose of this study is to acknowledge the use of celery leaf extract (*Apium graveolens L.*) 10% and Chlorhexidine glukonat 0.1% as mouthwash to accelerate the healing process of gingivitis after scaling and root planing.

**Method:** Experimental study using pre and post-test control group design. Samples were taken from FKG UNMAS students and RSGM FKG UNMAS patients within the period that met the inclusion criteria of caries patients, male sex, age 18-25 years old, with exclusion systemic disease and undergo orthodontic treatment, denture or prosthesis others. Subjects have index teeth (11, 16, 26, 36, 31, 46) and willing to take part in the research. A total of 32 samples divided into two groups by simple random sampling technique. Group I as control group rinsing with chlorhexidine gluconate 0,1% after scaling and Group II as experimental group rinsing with celery leaf extract 10% after scaling

**Result:** The mean of gingival index pre-post treatment in group I: 1,29+0,11 and group II: 1,09+ 0,16. Data analyzed with independent t-test, and the results shows no significant difference between both group ( $p=0,071$ )

**Conclusion:** Gargling for three days showed no significant difference between gargling with celery leaf extract (*Apium graveolens L.*) 10% and chlorhexidine gluconate 0.1% because it was equally effective at treating post-scaling gingivitis.

### INTRODUCTION

Periodontal disease arises as a result of the interaction between bacteria and hosts. The etiology of periodontal disease can be classified into two groups: local factors and systemic factors. Local factors and systemic factors are closely related and play a role in causing periodontal tissue damage. The main cause of periodontal disease is local factors, namely

plaque bacteria and calculus that accumulate on the tooth surface.<sup>2,4</sup>

Gingivitis is a periodontal disease caused by accumulation of plaque bacteria in the form of *Streptococcus mutans*, *Streptococcus sanguis*, *Actinomyces species*, and *Spirochaeta* found on the tooth surface. The primary treatment of gingivitis by excluding its etiologic factors that found in phase I of periodontal therapy is plaque and scaling

control. Expected later will reduce or eliminate inflammation so as to allow the gingival tissue to heal. Plaque is firmly attached to the tooth surface and can only be removed through mechanical and chemical cleaning.<sup>7</sup>

An antibacterial compound is needed to help remove inflammation by inhibiting bacterial growth and decreasing bacterial concentrations in plaque. Therapy of antimicrobial agents in gingivitis proved can reduce pocket depth, reduce the number of periodontal bacterial pathogens, and to obtain maximum care.<sup>4,7</sup>

Currently found many chemical-based mouthwashes, and quite dangerous for the stomach if swallowed, especially in children. Therefore, it needs safe natural mouthwash for the body and has minimal side effects.<sup>5</sup>

Chlorhexidine gluconate 0.1% is a very popular antibacterial mouthwash. Chlorhexidine gluconate 0.1% is a bisquaniid derivate which is very effective to reduce the occurrence of gingival inflammation and plaque accumulation. Side effects found in the use of *chlorhexidine gluconate* are staining on the teeth, calculus formation, and changes in taste perception. To minimize this then the patient should immediately rinse, brushing teeth after using it. Chlorhexidine gluconate 0.1% is not to be swallowed and must be removed after rinsing.<sup>3</sup>

Celery leaf (*Apium graveolens L.*) is a plant that can grow both in lowland and highlands. In Indonesia, celery leaves are used as a complement vegetables in cooking. Celery leaf contains flavonoids, saponins, tannins, apiins, essential oils, apigenins, choline, vitamins A, B, C, among its content, flavonoids, saponins, and tannins are antibacterial compounds. Many researcher use celery leaf because its advantages as not only easy to find but also has

antibacterial and antiinflammatory effect. Research on celery leaf has been done by previous researcher by testing the antibacterial potency of celery leaf extract (*Apium graveolens L.*) to *Streptococcus mutans in vitro*.<sup>9,10</sup>

The ingredients contained in celery leaf and *chlorhexidine gluconate* are expected to inhibit the activity of oral bacteria, thus accelerating the healing of gingivitis and certainly safe for human body, so it can be considered for use as a mouthwash.

This study uses celery leaf extract with concentration 10%, because no previous study explaining about the dose that gives antiinflammatory and antibacterial effect in order to boost and accelerates gingivitis healing process.

## METHOD

The tools and materials used in this research include: oral diagnostic tools, neerbecken, ultrasonic scaler, periodontal probe, lap cloth, handscoon, mask, gargle glass, stationery, research form and informed consent, celery leaf extract 10%, *chlorhexidine gluconate* 0.1%, mineral water and alcohol 70%.

The design of this study was an experimental Randomized Pretest-Posttest control group design.<sup>8</sup> The sample used was FKG UNMAS students and RSGM FKG UNMAS patients within the research period that met the inclusion criteria of caries patients, male ~~sex~~ gender, age 18-25 years old, did not have systemic disease, did not use orthodontics, denture or prosthesis others, the subjects have index teeth (11, 16, 26, 36, 31, 46) and willing to take part in the research. The drop out criterion is if the sample is not present

when the data is retrieved. The sample was obtained by Pocock (2008) formula, amounted to 32 people divided into two groups with simple random sampling technique i.e. Group I gargled with 10 ml celery leaf extract for one minute, Group II gargled with 10 ml *chlorhexidine gluconate* 0.1% for one minute.

Celery leaf leaves that used are obtained from plantations of celery leaf in Baturiti, Tabanan regency. Celery leaf extract is processed in Phytochemistry laboratory of Udayana University, Denpasar. Making celery leaf extract using 95% ethanol to obtain 100% celery leaf extract. Ethanol then removed by evaporation 10% celery leaf extract was obtained by dissolving 10 grams of 100% celery leaf extract with aquadest until it reaches 100 ml. Phytochemical tests were performed after celery leaf extract was obtained on the extract of celery leaf, containing Flavonoids (+), Tannin (+), and Saponin (+).

The gingival index was proposed in 1963 by Loe H and Silness J as a method to

assess the severity and quantity of gingivitis in patients. According to this method, parts of the facial, mesial, distal and lingual are assessed for inflammation and are scored 0 to 3. To assess the severity of gingivitis can be done by running a periodontal probe along the soft tissue wall of the gingival crevice (Table 1).

The study protocols in both groups were as follows: before the research is performed, the oral state of the individuals are examined using an oral diagnostic device. The condition of the gingivitis is examined, then the gingival index is calculated and then do scaling (Table 2). Scaling was done by researchers in Periodontics Laboratory Faculty of Dentistry University of Mahasaraswati Denpasar. The first group samples were instructed to rinse with 10 ml of Celery Leaf extract for one minute. And the second group rinse with 10 ml of Chlorhexidine gluconate 0.1% for one minute and rinsing is done two times a day for 3 days straight, after teeth brushing.

**Tabel 1.** Inflammation Score of The Gingiva

Clinical Symptoms	Bleeding	Inflammation	Score
Normal	No Bleeding	No inflammation	0
There are mild discoloration and swelling	No Bleeding	Mild	1
Redness, hypertrophy, swelling and shiny	Bleeding when probed	Moderate	2
Clear redness, hypertrophy and ulceration	Spontaneous bleeding	Severe	3

**Tabel 2.** Gingival Index Criteria

Gingival Index Average	Information
2,1 – 3,0	severe Inflammation
1,1 – 2,0	Moderat Inflammation
0,1 – 1,0	Mild Inflammation
<0,1	No Inflammation

**RESULT**

Analysis of treatment effect on celery leaf extract and chlorhexidine gluconate 0.1%. Normality test with Shapiro-Wilk obtained results of all data into two groups, before and after the normal distributed treatment ( $p > 0,05$ )(Table 3). From the analysis using T-test between treatment group 1 and treatment group 2, yielded data showing the results of Paired sample T-test (Table 4).

The result of treatment effect test with T-independent test after treatment between groups was obtained p value  $< 0.05$ . Based on the research that has been done in both groups of statistical test analysis using independent T-test showed ( $p < 0,05$ )(Table 5).

**Table 3.** Normality Test Results of Celery Leaf Extract and Chlorhexidine gluconate 0.1% (pre-post)

Treatment Group	n	sig
Pre-Celery Leaf Extract	16	0,087
Post-Celery Leaf Extract	16	0,053
Pre- Chlorhexidine gluconate 0.1%	16	0,108
Post- Chlorhexidine gluconate 0.1%	16	0,098

**Table 4.** Paired sample T-test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence interval of the difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pre-Post Celery Leaf Extract	1.09500	0,16978	0,04245	1.00453	1.18547	25.797	15	0,000
Pair 2	Pre-Post Chlorhexidine gluconate 0.1%	1.29625	0,11383	0,02846	1.23559	1.35691	45.549	15	0,000

**Table 5.** Homogeneity Test Results of Celery Leaf Extract and Chlorhexidine gluconate 0.1% (pre-post)

	Levene's Test		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% confidence interval of the difference	
								Lower	Upper
Data Equal Variance Assumed	3.495	.071	-3.938	30	0,000	-0.20125	0,05110	-0.30562	-0.09688
Data Equal Variance Not Assumed			-3.938	26.219	0,001	-0.20125	0,05110	-0.30625	-0.09625

The result of the analysis on the mean score of gingival index was found to be a non-significant differences of decrease gingivitis value in both groups rinsing with celery leaf extract and *chlorhexidine gluconate* 0.1% post scaling. Results from both groups showed equally effective in the treatment of post scaling gingivitis. The mean of gingival index pre-post treatment in group I: 1,29+0,11 and group II: 1,09+ 0,16. Data analyzed with independent T-results there were no significantly different between both group ( $p=0,071$ ).

## DISCUSSION

In the treatment group rinsing with *chlorhexidine gluconate* 0.1% yielded a mean decrease in gingival index score. The decrease in the gingival index score is caused by *chlorhexidine gluconate* 0.1% and celery leaf extract 10%. containing antiseptic and antibacterial which according to some studies have antibacterial activity by inhibiting the development of *Streptococcus sanguis* and *Streptococcus mutans* bacteria that trigger the formation of dental plaque and gingivitis trigger. The presence of antibacterial effect of *chlorhexidine gluconate* 0.1% and celery leaf extract can inhibit plaque bacteria and its product so as to decrease mean score of gingival index. Antibacterial substances in celery leaf extract contain flavonoids (*apiin dan apigenin*), saponins, and tannins. The mechanism of celery leaf as antibacterial activity is to attack membrane cell's cholesterol that caused its lipid modification to interfere bacterial ability to interact. When the cell membrane is disturbed, antibacterial substance will be easily invaded into cell and interfere its metabolism until the bacteria is killed. The mechanism of celery leaf extract as an antiinflammatory is preventing lysosome enzyme

secretion which is the inflammatory mediator. The prevention of this inflammatory mediator can prevent proliferation of inflammation process.<sup>9</sup>

Celery leaf extract also contains high vitamin C so it can increase body's immunity and help the absorption of all vitamins and minerals that help the acceleration of healing process. In the rinsing group with celery leaf extract and rinsing with *chlorhexidine gluconate* 0.1%, both of those group had decreased value in gingival index after scaling, because calculus as a predisposing factor for gingivitis in both groups has been eliminated through the scaling process. Calculus has a rough surface so that the remnants of food and bacteria are easily attached and multiplied which results in the thickening of the calculus. If this calculus is not removed it will lead to inflammation of the gingiva.<sup>7</sup>

This research is also supported by research that has been done by Suwandi (2012) which states that celery leaf extract has effects as anti-inflammatory, and antibacterial. Another thing that supports the statement, is because of the mechanical effects of the rinsing movement. The rinsing movement can move the cheek muscles so that the used of rinsing agent mechanically can release debris particles containing bacteria.<sup>9</sup>

Many factors can influence the results of this study. Obedience of subjects in the use of mouthwash does not rule out the possibility of influencing the results of research. Also affected by the diet and daily drinking and habits in maintaining oral health that cannot be controlled in this study.

## CONCLUSION

Rinsing with celery leaf extract (*Apium graveolens L.*) 10% and *chlorhexidine gluconate* 0.1% are equally effective in curing post scaling gingivitis. Further research is needed by using the

active component of celery leaf so that it can be known the most significant active component in healing post scaling gingivitis.

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