

## THE EFFECT OF BASIL LEAF EXTRACT (*OCIMUM SANCTUM*) AND LIME WATER (*CITRUS AURANTIFOLIA* S.) FOR TOOTH SURFACE WHITENING

Retno Dwi Sari<sup>1,2\*</sup>, Junaidi<sup>1,2</sup>

<sup>1</sup>Department of Dental Health, Politeknik Kesehatan Kementerian Kesehatan Jambi

<sup>2</sup> PUI-PK, Politeknik Kesehatan Kementerian Kesehatan Jambi

Corresponding author: [retnods@poltekkesjambi.ac.id](mailto:retnods@poltekkesjambi.ac.id)

### ABSTRACT

The color change of the teeth caused by intrinsic or extrinsic factors is known as discoloration. The purpose of the study was to see the effectiveness of the combination of basil leaf extract and lime extract on the effect of whitening the surface of discolored teeth.

The research was quasi-experimental. The Basil leaf extract and the Lime water were prepared using the maceration method and then divided into the following groups of combination, 30%B+70%L, 40%B + 60%L, 50%B + 50%L, 60%B + 40%L, 70%B + 30%L. All extracts were tested on the prepared and stained tooth to examine the whitening effect. Data collected were analyzed using the Mann-Whitney Test.

The effect of staining the tooth surface before and after soaking with a combination of basil extract and lime juice extract showed no difference ( $p < 0.05$ ), except for the 30% basil concentration group + 70% lime juice and the 40% basil concentration group + 60 lime juice. %. There was no difference in the effectiveness of the combination of basil leaf extract and lime extract on the effect of teeth whitening staining on the control ( $p > 0.05$ ).

**Keywords:** basil leaf extract; lime water extract; dental whitening

### BACKGROUND

Humans will be more confident with their appearance if their teeth are clean and the color looks whiter. The color of each individual's teeth varies greatly depending on the translucent and thickness of the enamel, the thickness and color of the dentin, and the color of the pulp (Grossman, L et al, 2013).

Discoloration of the teeth, especially in the anterior, will be the main complaint. This color change is known as discoloration. Intrinsic or extrinsic factors can cause this condition. Discoloration due to extrinsic factors can occur on the teeth's outer surface due to consuming tea, coffee, and tobacco stains. Stains can cause discoloration due to intrinsic factors in the enamel and dentin due to the accumulation

of tetracycline stain material. (Grossman, L et al, 2013).

Stains are difficult to remove just by brushing your teeth. Stain-cleaning techniques usually used in a dentist's office are mechanical or chemical. Mechanical stain cleaning uses an abrasive instrument combined with a medium polishing chemical by applying a chemical solution known as the OCO, which is very acidic so it can cause adverse side effects such as sensitive teeth after treatment.

Frequent and repeated sugar consumption will keep plaque pH below normal and cause demineralization (Kidd, 2015). Therefore, action to prevent or reduce dental health problems is to eliminate the factors that cause caries, one of which is removing plaque. Therefore, it is necessary to control plaque by removing

plaque accumulation mechanically (using a toothbrush or dental floss) and chemically (using mouthwash) or combining both. (Fejerskov and Kidd, 2008)

Mouthwash is a solution that contains antibacterial substances to reduce the number of microorganisms in the mouth, is used as an oral rinse, is easy to use, and can reach surface areas in the oral cavity that are difficult to reach by a toothbrush. The efficacious substance contained in mouthwash can be produced from synthetic or natural ingredients. Traditionally, many natural ingredients can empirically be used to maintain oral and dental health, including betel leaf, clove flower, tea leaf, and others (Kustcher et al., 1982).

Chemical stimulation from other natural ingredients obtained from gargling water-boiled basil leaves. Basil leaves contain flavonoids, eugenol, arginine, mannitol, boron, and essential oils. The presence of essential oils gives a distinctive taste that can stimulate and accelerate salivation and is thought to affect salivary pH. In addition, it can also inhibit the growth of bacteria in the mouth (Hariana and Arief, 2008). Moreover, the results of Ria's research (2017) also obtained the result that there was an effect of gargling water-boiled basil leaves on salivary pH.

Another type of herb is lime which contains flavonoids, saponins, and essential oils and has inhibitory power on some bacteria (Ramadhinta et al 2016). In addition, limes can whiten discolored teeth, where the citric acid content in lime flesh has a pH almost the same as the pH of natural tooth whiteners, namely sour strawberries (Rochmah, 2014). Likewise, in lemons, the results of a study by Nurdianti et al (2016) showed that the vitamin C content in lemon peels has the potential to be a teeth whitener and an anticancer.

There are various natural ingredients, and it is necessary to research which ingredients are most effective in whitening the tooth surface, which will prevent or minimize the emergence of dental and oral

health problems. In this case, tooth color's aesthetics and bacteria's inhibition. Therefore, it is necessary to research the effectiveness of a combination of basil leaf extract and lime extract on the whitening effect of the tooth surface.

This study aims to determine the effectiveness of basil extract and lime extract on the whitening effect of the tooth surface.

## RESEARCH METHODS

This type of research is quasi-experimental laboratory research. The research was conducted at the Pharmacy Laboratory of the Department of Pharmacy and the Laboratory of the Department of Dental Health at the Jambi Ministry of Health Polytechnic. The research subject is natural teeth to see the whitening effect on the tooth surface.

The independent variables of this study were basil leaf extract and lime extract. The dependent variable is the whitening effect of the tooth surface.

The stage of making basil leaf extract was carried out simultaneously with the manufacture of lime juice extract with various concentrations of 30%, 40%, 50%, 60% and 70%. Following the combination of basil leaf extract + lime extract with various concentration combinations. Tests for the effect of teeth whitening were carried out by combining the two extracts with various concentrations.

The statistical test uses a non-parametric test because the number of samples is small, namely: of various concentrations of the combination of basil leaf extract and lime extract on the effect of whitening the surface of the teeth from various concentrations of the combination of these extracts on guidance teeth were analyzed by the Mann-Whitney Test.

## RESULTS AND DISCUSSION

To see the effectiveness of using a combination of basil leaf extract and lime

extract on whitening the tooth surface. Used a combination of basil extract and lime juice extract as much as five variations in concentration, namely a combination of 30% basil extract + 70% lime juice, a combination of 40% basil extract + 60% lime juice, a combination of 50% basil extract + 50% lime juice, the combination of 60% basil extract + 40% lime juice, 70% combination of basil extract + 30% lime juice.

**Table 1.** Average Effect of Tooth Surface Staining

Concentration Basil + lime extract	n	Tooth Surface Staining				p-value
		Pre		Post		
		Average	SD	Average	SD	
30% + 70%	5	5,8	2,3	5,4	2,5	0.109
30% + 70%	5	4.1	1,6	4.1	1,6	0.157
30% + 70%	5	5,5	2.0	4.1	1,4	0.042
30% + 70%	5	6.4	2.2	4.3	2,7	0.042
30% + 70%	5	6.0	2.0	3,3	2,1	0.039
Control	5	6.5	1,7	4,7	1,1	0.042

Table 1 shows the value of the effect of whitening the tooth surface before and after a decrease, which previously had an average of 6.5, and after that, it was 4.7. The effect of tooth surface staining before and after soaking with a combination of basil extract and lime juice extract showed no difference ( $p < 0.05$ ), except for the 30% basil concentration + 70% lime juice group. and the 40% basil concentration group + 60% lime juice.

Table 2 shows that the Mann-Whitney test differs between groups of various concentrations of a combination of basil extract and lime juice extract, with the control group showing no difference ( $p > 0.05$ ).

**Table 2.** Results of the Mann-Whitney Test Difference Between the Effects of Tooth Surface Staining of Various Concentrations of a Combination of Basil Extract and Lime Water Extract with Control

Combination Concentration of Basil Extract + Lime Water Extract	N	Tooth Surface Staining Effect (Different Mann-Whitney Test (Sig.))
30% + 70%	5	0.070
40% + 60%	5	0.237
50% + 50%	5	0.597
60% + 40%	5	0.831
70% + 30%	5	0.108

Basil leaves (*Ocimum sanctum*) have active compounds such as essential oils, alkaloids, saponins, flavonoids, triterpenoids, steroids, tannins, and phenols. Essential oils and ethanol extract in basil leaves inhibit the growth of bacteria in the mouth, especially *Streptococcus Mutans* bacteria, which is one of the bacteria that cause caries (Ria, 2017). Lime (*Citrus aurantifolia* s.), one of its main ingredients, is a flavonoid that contains eriocitrin, hesperidin, and neoponcirin as well as saponins and essential oils. Based on several studies, lime's pharmacological activity can provide various pharmacological activity, namely as an antibacterial, antifungal, antioxidant, anticancer, teeth whitener, *Aedes aegypti* mosquito larvacide, anti-cholesterol (Pratiwi and Ferdiansyah, 2017).

The study results in table 3. show that from various concentrations of the combination of basil extract and lime juice extract with control, there was no difference in the value of the effect of tooth surface staining ( $p > 0.05$ ). These conditions indicate that various combinations of concentrations of basil leaf extract and lime juice extract do not affect tooth surface staining. This situation may be because the combined content of the two extracts differs from the control group's content.

However, in table 2, it can be seen that when different tests were carried out on the practical value of tooth surface staining before and after soaking with robusta coffee for seven days, the test results showed a difference ( $p < 0.05$ ) in the combination of basil extract and lime juice extract with a concentration of 50% + 50%, 60% + 40% and 70% + 30%. This situation shows that the concentration of lime juice extract in the research conducted effectively whitened the tooth surface.

Another study showed that lime could change the color of discolored teeth to whiter with a concentration of 2.5% and a soaking time of 30 minutes, 45 minutes, and 60 minutes. Lime juice contains citric acid, which has the same potential as ellagic

acid in strawberries to whiten teeth. This citric acid can whiten teeth because it has the potential to be an oxidizing agent like ellagic acid and hydrogen peroxide. This is because citric acid has OH in its chemical structure (Rochmah, 2014).

## CONCLUSION AND RECOMMENDATION

The effect of staining the tooth surface before and after soaking with a combination of basil extract and lime juice extract showed no difference ( $p < 0.05$ ), except for the 30% basil concentration + 70% lime juice and the 40% basil concentration + 60 lime juice group %.

There was no difference in the effectiveness of the combination of basil leaf extract and lime extract on the effect of teeth whitening staining on the control ( $p > 0.05$ ).

Further research is needed to find other alternatives in obtaining the effectiveness of staining the tooth surface.

## REFERENCES

- Fejerskov, O. and Kidd, E. (2008) Dental caries. The Disease and its Clinical Management. 2nd edn, Blackwell Munksgaard. 2nd edn. Iowa. doi: 10.1017/CBO9781107415324.004.
- Grossman L, Oliet S, Rio CED. (2013) Endodontics in Practice, 11 th ed. EGC, Jakarta, 454-468.
- Hariana, Arief. (2008) Medicinal Plants and their Benefits Series 2, Swadaya, Jakarta.
- Kidd, EA (2015) Essentials of Dental Caries. 3rd edn. New York: Oxford University Press.
- Nurdianti, L. et al. (2016) Formulation of Herbal Toothpaste Combination of Betel Leaf Extract (Piper betle) and Lemon Peel (Citrus) As Whitening and Antiseptic on Teeth, Journal of Health Bakti Tunas Husada, Vol.16 Number 1: 177- 187
- Prastiwi, SS, Ferdiansyah, F. (2017) Review Article: Ingredients and Pharmacological Activities of Lime (Citrus aurantifolia s.), Pharmacological Supplements Vol. 15 Number 2: 1-9.
- Ramadhinta, TM, Nahzi, MYI, Budiarti, LY, (2016) Test of Antibacterial Effectiveness of Lime Juice (Citrus Aurantifolia) As Natural Root Canal Irrigation Material Against Enterococcus Faecalis Growth In vitro, Dentino Journal of Dentistry, Vol 1(2): 6 -11.
- Ria, Ngena. (2017) The Effect of Gargling Basil Leaf Stew Water on Saliva pH in Students of SDN 060933 Simpang Pos Padang Bulan Medan Tahun 2017, Scientific Journal of PANNMED, Vol.12 No. 2 September-December : 127-132
- Rochmah, N et al. (2014) The Potential of Lime (Citrus aurantifolia) in Whitening Discolored Tooth Email, IDJ, Vol.3 No. 1 : 78-83