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KPPIKG 2016

The 17th Scientific Meeting and Refresher Course in Dentistry

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THE EFFECT OF STRAWBERRY ON COLOR CHANGING OF TOOTH WITH EXTRINSIC STAIN

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ABSTRACT

Tooth discoloration can occur for a variety of causes, both extrinsic and intrinsic. Staining of teeth from the outside (extrinsic stain) can be caused by chromogenic materials such as coffee, wine, cola, drinks or other foods, as well as nicotine from cigarettes. Strawberry was first discovered in Chilean-American, sweet and slightly sour, contains malic acid which acts as an active substance that will erode and remove stains on the tooth surface. **Objectives:** Finding the influence of strawberries in bleaching or cleaning teeth with extrinsic stain, by conducting experiments on human teeth that have been extracted. **Methods:** The approach used in this study is a quasi experimental design time series. The sample used is composed of 32 teeth there were 16 upper and 16 lower anterior teeth. Data collected by smearing teeth with crushed strawberries allowed to stand for 5 minutes, then brushed and rinsed. This treatment is carried out for 5 consecutive days with a frequency of three times a day. Tooth discoloration is measured by using a shade guide, while changes in the thickness of the stain was observed visually. **Results:** Results showed a 62.50% of the sample has changed 0-4 level, 25% changed 5-8 level, and 12.50% changed 9-12 level. The thickness of the stain changed was obtained 46.87% of the sample experienced a reduction in thickness into a score of 2, 40.63% to a score of 3, and 12.50% to a score of 1. Results of statistical analysis using Dependent T test showed changes in color and thickness of the stain before and after application of strawberries significantly with p-value 0.0001. **Conclusions:** Proven there was changes of tooth discoloration and or extrinsic stain thickness before and after treated with strawberries.

Key words: extrinsic stain, strawberry, tooth color

INTRODUCTION

In Law No. 36 of 2009¹ health is a human right and one of the elements of well-being that should be realized in accordance with the ideals of the nation of Indonesia as stipulated in the Pancasila and the Constitution of the Republic of Indonesia Year 1945. Still in Law The same Constitution, in article 101 paragraph (1) stated that the public be given the widest possible opportunity to cultivate, manufacture, distribute, develop, improve, and the use of traditional medicine that could be accounted for efficacy and safety.

According Wetter, Branco, Deana et al. states that² to have whiter teeth is a wish that is very frequent and common in patients and esthetic dentistry has now developed a series of techniques and materials for the purpose of whitening teeth.

There are three main types in discoloration of the teeth³: the first one is Extrinsic Discoloration, which appears if the outer layer of the tooth (enamel) tarnished. Chromogenic materials such as coffee, wine, cola, drinks or other foods, smoking also can cause extrinsic stain. The second is Discoloration Intrinsic, this occurs when the structure of the tooth (dentine) becomes dark or become

yellowish. This condition can also arise when: Too much exposed to fluoride at the age of early childhood; Pregnant women taking the antibiotic tetracycline during mid-gestation; The use of tetracyclines at the age of 8 years or less. The last one is Discoloration Associated with Age; this type is a combination of extrinsic and intrinsic factors. Naturally along with time the dentin will turn yellow. Because of age, enamel that protects the teeth become thinner, so the dentin becomes transparent. Food and smoke also can color in line with one's teeth grow old. Accidents can also lead to tooth discoloration, especially when the pulp has been damaged.

Tooth whitening using⁴ 10% carbamide peroxide agents are most commonly used in the home treatment, for reasons of safety and effectiveness. Variations of this technique have been known, including use of higher concentrations of carbamide peroxide material (10-22%). Many studies reveal that different concentrations of bleaching agents will result in decreased enamel hardness.

Frederick argued that⁵ of malic acid contained in strawberries act as a substance that will erode and eliminate

Table 1. Distribution of Tooth Color Before Treatment with Strawberries

No	Tooth Color	Samples	%
1	B1	2	6.25
2	A1	11	34.37
3	B2	1	3.12
4	A2	6	18.76
5	C1	1	3.12
6	D4	1	3.12
7	A3	6	18.76
8	A3.5	2	6.25
9	A4	2	6.25
	TOTAL	32	100

Notes: A1, B2, A2, C1, D4, A3, A3.5, A4
Tooth color coding sequence in the shadeguide

Table 2. Distribution of Tooth Color After Treatment with Strawberries

No	Tooth Color	Samples	%
1	B1	28	87.50
2	A1	1	3.12
3	B2	2	6.25
4	A2	1	3.12
	TOTAL	32	100

some stains on the tooth surface. Research has been done by Adawiyah⁶ also concluded that strawberries can be used as extrinsic tooth whitening ingredients.

OBJECTIVES

The purpose of this study was to determine the effect of strawberries in bleaching and/or cleaning teeth with extrinsic stain.

The hypothesis in this study is: No differences on teeth discoloration and/or extrinsic stain thickness before and after treated with strawberries. The alternative hypothesis is: There is a change in color of teeth and/or extrinsic stain thickness before and after treated with strawberries.

METHODS

This research was conducted at the Laboratory of Clinical Dentistry Of Nursing Department Of Health Polytechnic Jakarta I, which is located at Jl. Lebak Bulus III No. 1, Cilandak, South Jakarta. Data collection lasted for 5 (five) days, from November 28 2014 to December 2 2014.

This study used the method Quasi Experiment with design time series⁷ because the researchers wanted to know the effect of strawberries against discoloration of the teeth and the cleaning of tooth with extrinsic stain treated after application of strawberries.

Samples were permanent human teeth that have been extracted (avulsion), selected anterior maxilla and mandible teeth with extrinsic discoloration or extrinsic stain,

Table 3. Distribution Difference of Tooth Color Change

No	Difference of Tooth Color Change	Samples	%
1	0 – 4	20	62.50
2	5 – 8	8	25.00
3	9 – 12	4	12.50
	TOTAL	32	100

Table 4. Analysis Statistics Paired Sample Tooth Color

	Mean	SD	SE	P Value	N
Final Color	5.59	4.12	0.729	0.00	32
Beginning Color	1.28	0.851	0.150		32

assuming that the owner of the tooth has been adults with extracted anterior teeth / avulsion because of periodontal disease in adults. This study used a sample of 32 (thirty-two) teeth, which consists of 16 upper anterior teeth and 16 lower anterior teeth were experiencing extrinsic stain.

The independent variable in this study was strawberries with Operational Definitions: ripe red strawberries and crushed. The dependent variable is the change of tooth color and thickness of the extrinsic stain with Operational Definitions: the color of the surface of the teeth become lighter or stain thickness is reduced after the application of strawberries.

The instrument used in this study is a shade guide (the measurement of tooth color) and a recording sheet color of teeth. Tools and materials used for this study is a mortar and pestle, tweezers, toothbrush, cotton, three way syringe.

The data collected is a primary data for the dependent variable with the following procedures. Tooth samples planted in a block of plaster. Then noted the color of the teeth on the labial surface using a shade guide and record the thickness of the extrinsic stain on the surface of the palatal / lingual. Three to five ripe strawberries crushed using a mortar and pestle, then apply strawberries by attaching crushed strawberries on the entire surface of the tooth. Wait for 5 minutes, clean up strawberries from the tooth surface by scrubbed using a toothbrush, then rinse with water and dry up with a three way syringe. Record the color of teeth by comparing the color indicated on the shade guide, conduct visual observation to note the thickness of the extrinsic stain. Keep applying the strawberries with same steps three times a day, for five days.

Data were analyzed using univariate for each dependent variable is the tooth color and thickness of the extrinsic stain. Further analysis by T test Bivariate Dependent (in pairs).⁸ This test was performed to test the average difference between the two groups of dependent data. Two paired sample means a sample with the same

Table 5. Results of Analysis Samples Test Paired Differences of Teeth Color

	Paired Differences					t	df	Sig.(2-tailed)
	Mean	SD	SE Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Final Color-Beginning Color	4.313	3.788	0.670	2.947	5.678	6.440	31	0.000

Table 6. Distribution of Extrinsic Stain Thickness Before Treatment With Strawberries

No	Stain Thickness	Samples	%
1	VD	11	34.37
2	D	16	50.00
3	C	5	15.63
4	VC	0	0.00
	TOTAL	32	100

Legend:

- VD : Very Dirty
- D : Dirty
- C : Clean
- VC : Very Clean

Table 7. Distribution of Extrinsic Stain Thickness After Treatment With Strawberries

No	Stain Thickness	Samples	%
1	VD	0	0.00
2	D	4	12.50
3	C	15	46.87
4	VC	13	40.63
	TOTAL	32	100

subject but have two different treatments or measurements. In this case to determine whether there are differences in tooth color and thickness of extrinsic stain before and after treatment with strawberries.

RESULTS

From Table 1 it can be seen that the majority of tooth color is A1 as much as 34.37%, followed by the next highest order is the color A2 and A3 by masing2 18.76%. After treatment with strawberry fruit turns into a tooth color B1 as much as 87.5%, followed by color B2 as much as 6.25%, and the color A1 A2 also 3.12% respectively. It is as listed in Table 2.

From Table 3 it can be seen that there are 62.50% of the samples teeth decreased tooth color from 0 to 4 levels of color of the teeth, while the decline 5 to 8 tooth color

Table 8. Distribution of Extrinsic Stain Thickness Change

No	Extrinsic Stain Thickness Change	Samples	%
1	1	4	12.50
2	2	15	46.87
3	3	13	40.63
	TOTAL	32	100

Table 9. Results of Paired Sample Statistics of Extrinsic Stain Thickness

	Mean	SD	SE	P Value	N
Final Stain	2.28	0.683	0.121	0.00	32
Beginning Stain	0.81	0.693	0.122		32

tooth color level of 25%, in addition there are also samples of teeth which decreased tooth color between 9 to 12 levels of tooth color is as much as 12.50%.

From Table 4 it can be seen that in this study obtained Mean Initial Color of 1.28 with SD 0.851 and 0.150 SE. Color available at Mean End of 5.59 to 4.12 SD and SE 0,729.

From the analysis of the differences as shown in table 5, with P Value of 0.0001 in this study proved to be a significant difference between Beginning color with the Final Color. Therefore it is proven that strawberries can change the color of the teeth become lighter or whiter.

At the beginning of the thickness of the extrinsic stain recording the data obtained as listed in table 6 that 50% of the entire sample has a thickness of extrinsic tooth stain D (dirty), then followed with a thickness VD (very dirty) amounted to 34.37%, and the surface of the teeth including in C (clean) amounted to only 15.63%.

On table 7, after being given treatment application strawberries on samples of teeth, it was found that the thickness of the extrinsic stain is greatest in group C as much as 46.87%, followed by the VC group as much as 40.63%, and D groups amounted to 12.50%.

Table 10. Results of Samples Test Paired Analysis of Differences Extrinsic Stain Thickness

	Paired Differences			95% Confidence Interval of the Difference		t	df	Sig.(2-tailed)
	Mean	SD	SE Mean	Lower	Upper			
Final Stain-Beginning Stain	1.469	0.621	0.110	1.245	1.693	13.371	31	0.000

For changes of the thickness of the extrinsic stain, in Table 8 it can be seen that the changes in the thickness of the extrinsic stain of the biggest is the change in the thickness of the stain with score 2 (teeth in clean condition) is as much as 46.87%, followed by changes in the thickness of the stain with score 3 (teeth in very clean conditions) as much as 40.63%, while the remaining 12.50% is only changing the thickness of the stain with score 1 (teeth in dirty conditions).

From Table 9 it can be seen that the results of the analysis in this study obtained Initial Stain Mean SD of 0.81 to 0.693 and 0.122 SE. At Stain obtained Mean End of 2.28 with SD 0.683 and 0.121 SE.

From the analysis of the differences as shown in Table 10, with P Value of 0.0001 in this study proved to be a significant difference between the Beginning and the Final Stain. Therefore strawberries can clean extrinsic stain.

The analysis showed that the hypothesis is rejected and alternative hypothesis accepted, which proved there was differences of tooth discoloration and or extrinsic stain thickness before and after treated with strawberries.

DISCUSSION

The results showed that there were significant changes in tooth color and thickness of the extrinsic stain after treatment with strawberries. These findings did not differ much from the results of research conducted by Adawiyah, where her research conducted on 30 human teeth were soaked in coffee for 3 days, then rubbed using strawberries as much as 32 times over 5 days. By using statistical analysis Wilcoxon Matched-Pairs Signed Rank Test showed that no color change significantly with $p < 0.05$. Adawiyah concluded that strawberries can be used as an ingredient of extrinsic tooth whitening.⁶

In our research, the difference is in the type of extrinsic stain, which is not only limited to the stain due to coffee consumption only, but extrinsic stain obtained for various chromogenic substances given, which researchers do not know the history of the formation of extrinsic stain on the sample used. However, from the literature search that chromogenic materials such as coffee, wine, cola, drinks or other foods, smoking also can cause extrinsic stain that will cause stains on the tooth surface with color ranging from yellow-brown to blackish brown.

Results of this study proved that strawberries can change the thickness of the stain toward cleaner, in line with the opinion by Wahyudi and Wright, in which malic acid

contained in strawberries act as a substance that will erode and eliminate some stain on the surface of teeth.^{3,16}

On Kwon's study showed that the teeth are brushed with a mixture of baking soda- strawberry show bleaching is not true, based on two test color measurement is already well known and evaluation using a spectrophotometer. The only advantage of doing it yourself method (strawberry and baking soda) is likely to make your teeth look whiter, because the mixture is just clearing the accumulation of plaque on the surface of tooth.¹¹

Limitations of this study was did not use a spectrophotometer color measurement, and the sample used was avulsed tooth which has not known history of the formation of the extrinsic stain.

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