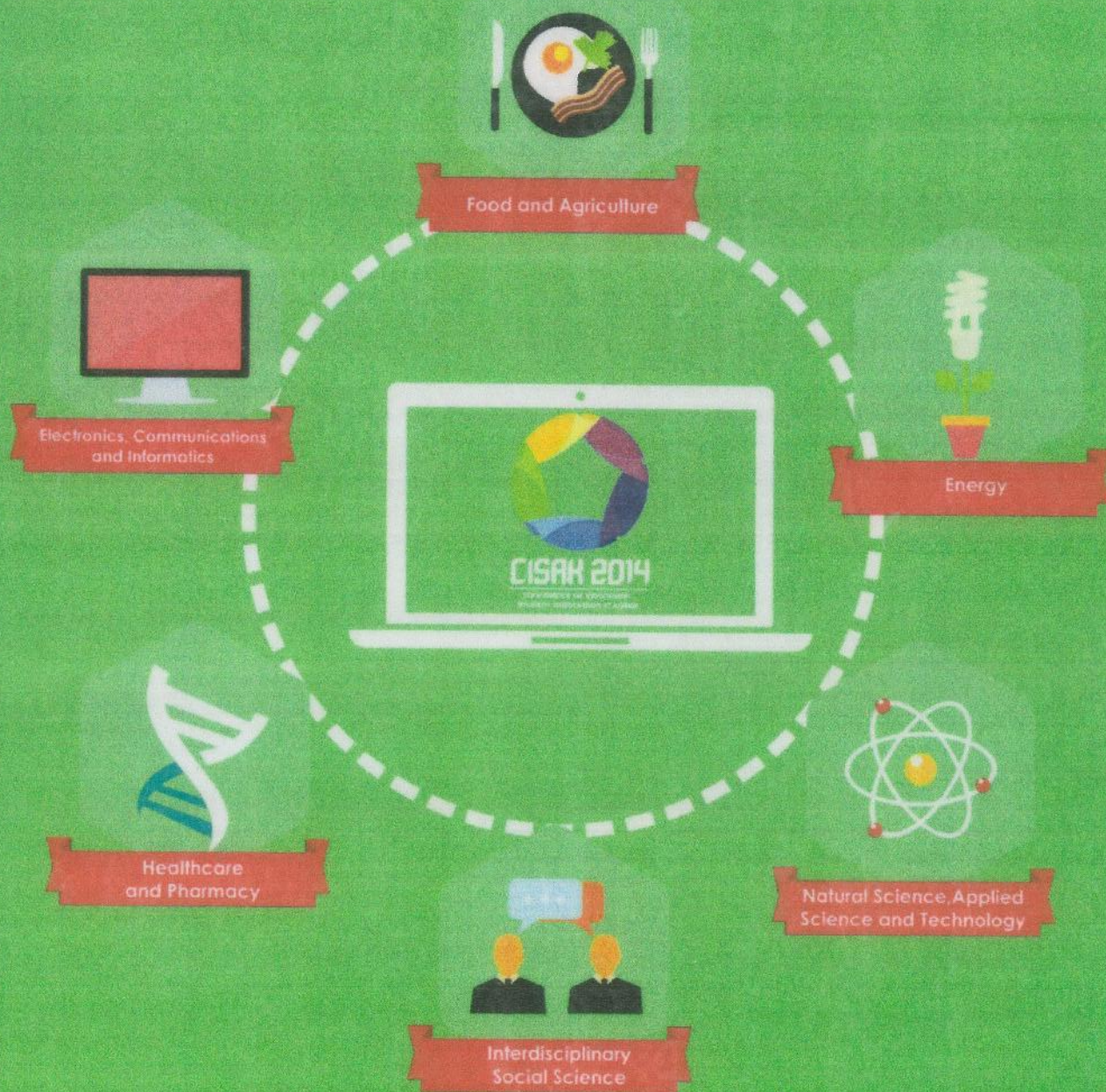


CISAK 2014

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Navigating Indonesia Diaspora For a Better Future

The Influence of Tomato Juice as an Alternative Treatment to Whiten The Teeth

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Abstract. Objective: The purpose of this research is to determine the effect of tomato juice on teeth whitening which naturally containing hydrogen peroxide (H₂O₂). In dentistry, the color change of teeth can be treated by tooth bleaching. However, the using of chemical materials in tooth bleaching can causes side effects to gingiva. We think by using herbal material can solve the matter. We hypothesized, the contains of hydrogen peroxide (H₂O₂) in tomato (*Lycopersicon esculentum Mill*) can be an alternative whitening material. **Methods:** The experimental research was using 10 post-dental extraction teeth as samples. The teeth smeared with tomato juice and incubated for 2 hours at a temperature of 37° C. After 2 hours the teeth were kept in a solution of 0.9% saline and incubated again for 22 hours over 3 days. Color changes were observed using a shade guide. **Results:** Observation was obtained qualitatively and quantitatively. The qualitative data showed that the teeth were whitened after application of tomato juice. Color change of teeth occurs heterogeneously. The result of Wilcoxon's non-parametric analysis shows that there's significant color changing affected by tomato juice (*Lycopersicon esculentum Mill*) application with $p=0,016$. **Conclusion:** Tomato juice (*Lycopersicon esculentum Mill*) can be an alternative treatment to whiten the teeth.

Keywords: Hydrogen Peroxide, Tomato Juice, Tooth Bleaching

A. INTRODUCTION

Aesthetics is one of many matters which people concerned. It's strictly related to confidence. For the example is bright and clean teeth. The color of teeth is being influenced by the anatomy structure. Generally, color of teeth will change along with the process of aging because extrinsic and intrinsic factors [1]. Commonly, the color of adult's teeth are yellow to gray, white to gray, or white to yellow. The color change of teeth will affect to people's confidence. This change is affected by lifestyle and systemic condition.

In dentistry, medical treatment for whiten the color of teeth are done by tooth bleaching. Tooth bleaching nowadays is based upon hydrogen peroxide as the active agent [2]. This hydrogen peroxide (H₂O₂) bleaches the chromogen within the dentin and it's often used in combination with an activating agent such as heat and/or light, which can reduce the body color of the tooth. Hydrogen peroxide (H₂O₂) is a colorless liquid with a bitter taste and is highly soluble in water to give an acidic solution. Hydrogen peroxide (H₂O₂) is an oxidizing agent of industrial applications in bleaching [3] [4] [5]. Low concentrations of hydrogen peroxide (H₂O₂) have been found in rain and surface water, human and plant tissues, foods and beverages and bacteria [3]. Hydrogen peroxide (H₂O₂) can release free radicals as a toxic [4]. In tooth bleaching or whiten teeth, hydrogen peroxide (H₂O₂) may not be used exceeding the doses because it can be dangerous substance for body [6].

Foods that contain color additive are easy to get in Indonesia. It's being reason why color change of teeth can be easily found in Indonesia. Indonesia as developing country and the high cost of tooth bleaching, make this treatment only affordable by certain people. Besides, tooth bleaching have

side effects. Tooth sensitivity is a common side-effect of external tooth bleaching, and high concentration of material agent of tooth bleaching is caustic to mucous membranes and may cause burning and bleaching of the gingiva [2]. So, an alternative treatment using herbal material which is easy to get can be the solution.

The material agent of tooth bleaching can be derived from vegetables or fruits. For example, hydrogen peroxide (H₂O₂) is contained in tomato (*Lycopersicon esculentum Mill*) [6] [7]. Tomato (*Lycopersicon esculentum Mill*) is usually consumed as juice. We hope that people can see the possibility of tomato as a teeth whitening by consuming them

B. MATERIALS AND METHOD

In this research we used 10 post-dental extraction teeth as samples. The samples were soaked in normal saline solution for a minute. Each sample was put into plastic bottles which have been numbered (1-10).

As much as 100gr of tomato (*Lycopersicon esculentum Mill*) were washed and juiced. After that, samples were smeared with tomato juice until it covers the enamel. Then smeared samples were put on aluminum foil which numbered one until ten. The samples were put into the incubator in 37° C temperature for 2 hours. After 2 hours, samples were washed in tap water until clean, continued by dried with tissues and put back to the plastic bottles which filled by solution of 0,9% saline and incubated for 22 hours. Set the temperature as high as 37° C. These procedures are repeated for 3 days. Each of the samples are measured before and after each cycles using shade guide *Estelite Sigma Quick*. Score arrangement of color's teeth are; B1:1; A1:2; B2:3; D2:4; A2:5; C1:6; C2:7;

D4:8; A3:9; D3:10; B3:11; A3,5:12; B4:13; C3:14; A4: 15; C4:16 [7] [8].

C. RESULTS

Results of experiment are recorded as qualitative and quantitative data. Qualitative data set are shown on table 1. Our observation shown that there are some rates of color shift before and after smearing the teeth using tomato juice. For the example, the color of sample 1 changes from A3 scale to A2 scale after being smeared by tomato. Table 2 shows color change of teeth before and after smeared by tomato juice (*Lycopersicon esculentum Mill*) based on average measurement and it shows that averages measurement before being smeared by tomato is 7,30 and after being smeared is 4,40. The result of *Wilcoxon's* non-parametric analysis shows that there's significant color changing affected by tomato juice application with $p=0,016$ (Table 2).

Table 1. Results of experiment before and after being smeared by tomato juice (*Lycopersicon esculentum Mill*) on qualitative a scale.

No	Tomato Juice (<i>Lycopersicon esculentum Mill</i>)	
	Before	After
1	A3	A2
2	A2	A1
3	A2	A1
4	A2	A2
5	A2	A2
6	A3	A2
7	A3	A2
8	A3	A2
9	A3,5	A2
10	A2	A2

Table 2. Average and standard deviation of color change of teeth before and after being smeared by tomato juice.

Group of treatment	*n	Before	After	p
		*($\bar{x} \pm SD$)	($\bar{x} \pm SD$)	
Tomato juice (<i>Lycopersicon esculentum Mill</i>)	10	7,30 \pm 2,584	4,40 \pm 1,265	*0,016

Note: n: total of samples, \bar{X} : mean, SD : standard deviation, and significant difference of *Walcoxon* ($p \leq 0,05$)

D. DISCUSSION

Based on the results, we found that there was teeth color changing after smeared by tomato juice (*Lycopersicon esculentum Mill*). Color change of teeth has many variations in degree. These color change variations are possibly affected by the thickness of email [7] [9]. Because the teeth samples were taken from different patients, enamel thickness, plaque existence, and sum of calculus are expected to have some degree of variations.

These differences partly affected by age variation between the samples' original owners. The enamel layers will be diminished and the dentin will become thicker through the

aging process [7] [10]. Natural color of enamel is translucent white. Thus the structure under this layer is readily seen. The structure called dentin. Dentin's natural color is yellow. But, teeth nerve that penetrating dentin's porous structure resulting a darker color of teeth [1].

Hydrogen peroxide (H_2O_2) diffuses through email to dentin and act as a strong oxidizer which produced free radical which is quite reactive [4] [11]. This free radical attacks the organic molecules (stains) in the teeth to achieve stability [11]. Hydrogen peroxide (H_2O_2) is capable of oxidizing a wide range of colored organic and inorganic compounds, causing decoloration and hence bleaching of the substrate [5].

E. CONCLUSION

Color change of teeth happened after being smeared by tomato juice for 3 days. We concluded that tomato juice (*Lycopersicon esculentum Mill*) can be an alternative treatment for whitening the teeth.

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CERTIFICATE OF PARTICIPATION

Nila Kasuma

In recognition and appreciation of your valued contribution as

AUTHOR

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Daejeon (South Korea), 24th August 2014



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