



Strawberry Gel with a Concentration of 83% and 75% as an Extrinsic Stain Remover

Ita Astit Karmawati¹, Ita Yulita², Indri Kusuma Dewi³

^{1,2} Health Polytechnic of Jakarta I, Indonesia

³ Health Polytechnic of Surakarta, Indonesia

ABSTRACT

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Strawberries have many benefits, where the malic acid contained in strawberries acts as a substance that will erode and remove several stains on the surface of teeth, including cleaning extrinsic stains. Gel preparations are widely used in medicines, cosmetics and food products, including toothpaste and teeth whitening agents. The purpose of this study was to determine the effectiveness of strawberry gel with a concentration of 83% and 75% in cleaning teeth with extrinsic stain on academic member of the Health Polytechnic Jakarta I. This study was an Experiment on 30 people who had upper and lower anterior teeth with extrinsic stain as samples. Data collection was done by applying strawberry gel on the surface of the anterior teeth, allowed to stand for 5 minutes, then brushed and rinsed with water. This procedures was done 2 times a day for 5 consecutive days. Changes in extrinsic stain are measured using the Lobene Stain Index which measures the intensity and area of the stain, as well as a combined score of both. The average of combined score with measurements using the Lobene Stain Index for extrinsic stain before being treated with strawberries. Hopefully the score will decreased every day starting from day 1 to day 5 of treatment.

KEYWORDS:

Strawberry gel, extrinsic stain

INTRODUCTION

Tooth discoloration caused by extrinsic and intrinsic causes will certainly interfere with appearance. Physiological changes in tooth color can occur with age. Pathologic color changes can be extrinsic and intrinsic. Extrinsic discoloration can be caused by deposits that occur on the tooth surface, while intrinsic discoloration is caused by factors within the tooth tissue or pulp tissue.[1, 2] Teeth whitening by dentists is termed as in-office bleaching, whereas what is done at home is referred to as at home bleaching. One of the ingredients used to whiten teeth is Hydrogen Peroxide (H₂O₂) and Carbamid Peroxide. 10 percent Hydrogen Peroxide is the same as Carbamid Peroxide 2 percent. However, research concluded that the use of Carbamid Peroxide 2 percent 60 seconds a day for 3 days alone can significantly cause inflammation of the oral mucosa.[3–5]

Corresponding Author: Ita Astit Karmawati

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WHO recommends and promotes traditional/herbal medicines in natural health care programs because they are easily available at low cost, and are relatively safe. Emphasizes the need to ensure quality control of medicinal plant products using modern techniques and applying appropriate standards.[6, 7]

In several articles of health, strawberries has long been known to have many benefits. Malic acid contained in strawberries acts as a substance that will erode and remove some stains on the surface of the teeth. Research concluded that strawberries can be used as extrinsic teeth whitening ingredients, whereas our previous study also concluded that the application of strawberries can change the color of teeth to be brighter, and our other studies have shown that strawberries can clean extrinsic stain.[8–10] Gel preparations are widely used in medicines, cosmetics and food products as well as in several industrial processes. In cosmetics, namely as preparations for skin care, shampoo, fragrance preparations and toothpaste including teeth whitening agents.[11, 12]

Based on the background, the researchers are interested in conducting further experiments in the form of how effective the strawberry gel in removing an extrinsic stain of the teeth. This study intends to find the effectiveness of strawberry gel

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with a concentration of 83% and 75 % in removing extrinsic stain.

METHOD

The research was carried out through several stages which included: testing the effect of the application of strawberries in cleaning stains on avulsion teeth in the laboratory (in vitro study in 2014). Followed by testing the effect of the application of strawberries in cleaning stains on teeth that are still in the mouth (done in 2015). Next stage was testing the Effectiveness of strawberry extracts with concentrations of 100%, 75%, 50% and 25% to remove tooth stain on teeth that have been avulsed in the laboratory (in vitro in 2017). The next stage which testing the effectiveness of removing tooth stain using strawberry fruit extract with a concentration of 100% on teeth in human (in vivo in 2019), and in 2021 we have already proofed the effectiveness of strawberry gel with concentration of 83% and 75% to remove stain in avulsion tooth (in vitro), and in this stage we will testing the effectiveness of strawberry gel in human teeth and the durability of the gel in 2 years ahead.

The research design used was an experiment which will conduct in 2 years. This research was conducted at the Clinical Laboratory of the Dental Health Department of the Health Polytechnic Jakarta I. The time of the study was carried out from January-December 2023, where the gel has been made in July 2023, and data collection was carried out in December 2023 for 5 (five) consecutive days. The population in this study was the member of academic community in the Health Polytechnic Jakarta I. The study sample consisted of 30 students and employees who had anterior teeth with extrinsic stain as a treatment group.

The sample collection technique was used purposive sampling. Before we conducted this research we were very concerned about ethical studies, because in this study the object of the study was humans, although using materials that would be applied to human body tissues in the form of strawberries were safe for consumption. The application of strawberries to the teeth relatively will not cause side effects if the duration is according to the provisions, that is 5 (five) minutes.

RESULTS

Table 1. Normality Test on 83% and 75% Gel Concentration Data

| Variable | p-value | |
|------------|-----------------------|-----------------------|
| | 83% Gel Concentration | 75% Gel Concentration |
| Combined_0 | 0.070 | 0.038 |
| Combined_1 | 0.506 | 0.284 |
| Combined_2 | 0.326 | 0.200 |
| Combined_3 | 0.194 | 0.054 |
| Combined_4 | 0.049 | 0.161 |
| Combined_5 | 0.019 | 0.002 |

From the results of the normality test above, there are 2 data that are not normally distributed, (<0.05), so the test carried out must use a non-parametric test. In this case, the test used

is the Friedman test because the data in this study contains more than two groups of paired data

Table 2. Average Extrinsic Stain Scores Test Based on Intervention Time At 83% Gel Concentration

| Concentration of Strawberry Gel | n | Initial score | Mean Rank (day-) | | | | | P Value |
|---------------------------------|-----------|---------------|------------------|------|------|------|------|---------|
| | | | 1 | 2 | 3 | 4 | 5 | |
| 83 % Concentration | 15 | 5.67 | 4.67 | 4.33 | 3.00 | 2.03 | 1.30 | 0,000 |

* *Friedman*

From this results, it was found that the mean rank in testing the concentration of strawberry gel on the stain score before the intervention was 5.67 and on the fifth day it was 1.30. The statistical test results show that the p-value is 0.000, which

means that at alpha 5% there is a significant difference in the decrease in extrinsic stain scores between the five days of treatment.

Table 3. Average Extrinsic Stain Scores Test Based on Intervention Time At 75% Gel Concentration

| Concentration of Strawberry Gel | n | Initial score | Mean Rank (day-) | | | | | P Value |
|---------------------------------|-----------|---------------|------------------|------|------|------|------|---------|
| | | | 1 | 2 | 3 | 4 | 5 | |
| 75 % Concentration | 15 | 5.37 | 4.80 | 4.33 | 3.07 | 2.33 | 1.10 | 0.000 |

* *Friedma*

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From the research results, it was found that the mean rank in testing the strawberry gel concentration was 75% of the stain score before the intervention was 5.37 and on the fifth day it was 1.10. The statistical test results show that the p-value is

0.000, which means that at alpha 5% there is a significant difference in the decrease in extrinsic stain scores between the five days of treatment.

Table 4. Testing The Effectiveness of Strawberry Gel Concentration on Reducing Extrinsic Stain Scores

| Concentration of Strawberry Gel | N | Mean Rank | Z | p-value |
|---------------------------------|----|-----------|--------|---------|
| 83 % Concentration | 15 | 12.60 | -1.147 | 0.251 |
| 75 % Concentration | 15 | 8.50 | | |

From the research results, it is known that the mean rank value at a strawberry gel concentration of 83% is 13.70, while at a concentration of 75% it is 17.30. Statistical test results show that at alpha 5% (0.05) there is no significant difference in the concentration of strawberry gel 83% and 75% in reducing the extrinsic stain score.

DISCUSSION

Strawberries were chosen as the natural ingredient studied in this study because strawberries contain ellagic acid and malic acid which can whiten teeth. This research uses strawberries as an alternative bleaching agent in gel preparation form with strawberry extract concentrations of 83% and 75%. The stain measurement index used in this study is the Lobene Stain Index (LSI) which looks at stain intensity (thickness/severity) and extent (spread) on the tooth surface. The Lobene Stain Index measures the intensity (intensity) and extent (area) of extrinsic stains on the facial/labial and lingual/palatal surfaces.[13, 14]

In the strawberry gel concentration test of 83%, the stain score before intervention was 5.67 and on the fifth day it was 1.30. The statistical test results show that the p-value is 0.000, which means that at alpha 5% there is a significant difference in the decrease in extrinsic stain scores between the five days of treatment. In testing the strawberry gel concentration was 75%, the stain score before intervention was 5.37 and on the fifth day it was 1.10. The statistical test results show that the p-value is 0.000, which means that at alpha 5% there is a significant difference in the decrease in extrinsic stain scores between the five days of treatment.

From the research results, it is known that the mean rank value at a strawberry gel concentration of 83% is 13.70, while at a concentration of 75% it is 17.30. Statistical test results show that at alpha 5% (0.05) there is no significant difference in the concentration of strawberry gel 83% and 75% in reducing the extrinsic stain score.

The results of the analysis showed that there was a decrease in the stain index in both the intensity score and expansion score from day 1 of treatment to day 5, which ultimately also reduced the combined score. This is in line with previous research conducted by Karmawati et al, where the application of strawberry gel preparations was carried out during 5 consecutive days can reduce the stain score significantly.[15]

CONCLUSIONS

The extrinsic stain score before treatment using strawberry gel at a concentration of 83% was 5.67; and at a concentration of 75% it was 5.37. The extrinsic stain score after treatment using strawberry gel with a concentration of 83% was 1.3. The extrinsic stain score after being treated using strawberry gel with a concentration of 75% was 1.1. There was a significant difference in the reduction of extrinsic stain scores between the five days of treatment, at a concentration of 83% it was 4.37; and at a concentration of 75% it was 4.27. But there is no significant difference in the concentration of strawberry gel 83% and 75% in reducing the extrinsic stain score. And the greatest number of days needed to reduce the extrinsic stain score is after 5 days of treatment.

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CONFLICT OF INTEREST

The authors declare that they have no conflicting interests.

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