

## Effect Of Apple Juice On Whitening Teeth After Immersion In Coffee Solution *In Vitro*

### Pengaruh Pemberian Jus Apel Terhadap Pemutihan Gigi Setelah Direndam Larutan Kopi Secara *In Vitro*

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#### Abstract

**The Background** of this research because one of the extrinsic cause teeth discoloration is excessive coffee consumption. To cope teeth discoloration whitening teeth done either with chemicals or natural ingredients. Apples (*Malus sylvestris Mill*) is one of the fruits that contain malic acid, substance that can whitening teeth. **The General Objective** is to determine the effect of giving apple juice (*Malus sylvestris Mill*) on a teeth that has been soaked in coffee solution on teeth whitening *in vitro*. **Materials and Methods** research is experimental laboratory use elements of the permanent maxillary premolar tooth from extraction indications orthodontic treatment, free of caries and hypoplasia as a sample of 12 pieces, divided into 2 groups. The first group as a control group with 100 ml distilled water immersion. The second group as the treatment group using apple juice immersion with 75% concentration. Samples of tooth element has immersed first in coffee solution during 2 weeks until discoloration then immersed according to the group for 2 weeks (3x@5minutes a day), then measured the color changes of tooth. **The Result** with *Paired T-test* showed significant effect on the group before treatment and after treatment ( $p < 0.05$ ). *Independen T-test* result showed significant difference between the control group immersed in 100 ml distilled water and treatment group, immersed in apple juice 75% concentration. **Conclusion** of the results showed that apple juice has the ability to whiten the tooth enamel surface that changes color because of immersion in coffee solution so it can return to the original color before discoloration.

**Keywords:** teeth discoloration, apple juice, teeth whitening

#### Abstrak

**Latar belakang** dilakukannya penelitian ini karena salah satu penyebab ekstrinsik perubahan warna gigi adalah konsumsi kopi yang berlebihan. Untuk menanggulangi perubahan warna gigi dilakukan pemutih gigi baik dengan bahan kimiawi maupun bahan alami. Buah apel (*Malus sylvestris Mill*) merupakan salah satu buah yang mengandung asam malat, yaitu zat yang dapat memutihkan gigi. **Tujuan umum penelitian** ini adalah untuk mengetahui pengaruh pemberian jus apel (*Malus sylvestris Mill*) pada gigi yang telah direndam larutan kopi terhadap pemutihan gigi secara *in vitro*. **Material dan Metoda** penelitian adalah eksperimental

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laboratoris menggunakan elemen gigi premolar rahang atas permanen yang berasal dari pencabutan indikasi perawatan ortodontik, bebas karies dan hipoplasia sebagai sampel sebanyak 12 buah yang terbagi menjadi 2 kelompok. Kelompok pertama sebagai kelompok kontrol dengan rendaman aquadest 100 ml. Kelompok kedua sebagai kelompok perlakuan menggunakan rendaman jus apel dengan konsentrasi 75%. Sampel elemen gigi direndam dalam larutan kopi terlebih dahulu selama 2 minggu sampai terjadi perubahan warna kemudian direndam sesuai kelompok selama 2 minggu (3x@5menit/hari), lalu diukur perubahan warna giginya. **Hasil penelitian** dengan uji *Paired T-test* menunjukkan adanya pengaruh yang signifikan pada kelompok sebelum perlakuan dan setelah perlakuan dengan ( $p < 0,05$ ). Hasil uji *Independent T-test* menunjukkan adanya perbedaan yang bermakna antara kelompok kontrol yang direndam dalam aquadest 100 ml dengan kelompok perlakuan yang direndam dalam jus apel konsentrasi 75%. **Kesimpulan** hasil penelitian menunjukkan bahwa jus apel memiliki kemampuan untuk memutihkan permukaan email gigi yang berubah warna akibat direndam larutan kopi sehingga dapat kembali ke warna asal sebelum mengalami perubahan warna tersebut.

**Kata kunci:** perubahan warna gigi, jus apel, pemutihan gigi.

## Introduction

The discoloration is one of the abnormalities of the teeth which can affect the aesthetics of the face. Extrinsic teeth discoloration found on the outer surface of the teeth and usually derived locally, such as stain of tobacco, coffee or tea consumption<sup>1-2</sup>. Excessive consumption of coffee may cause discoloration of the teeth, this was due to the influence of caffeine and the acid contained in it. Teeth discoloration caused by the consumption of cigarettes, drinking coffee and tea can be removed by brushing your teeth properly and regularly, tartar cleaning (scaling) and teeth whitening (bleaching) extra coronal techniques<sup>1</sup>.

Teeth whitening is one way of handling teeth discoloration with the recovery of discolored teeth, until close to the color of natural teeth with a chemical process improvements and the goal is to restore aesthetic factors of the patient. Teeth whitening can be performed on vital teeth as well as non-vital teeth discoloration<sup>3</sup>. This aesthetic treatment technique is often done because it has several advantages such as easy to work, the technique is relatively simple implementation and cost less and do not take the dental hard tissues<sup>4-6</sup>.

To cope teeth discoloration whitening teeth done either with chemicals or natural ingredients. Utilization of natural materials are very popular in the community lately due to natural ingredients are considered more secure, inexpensive and easily obtained compared with the chemical. Apples (*Malus sylvestris Mill*) is one of the fruits that contain malic acid, a substance that in some measure believed to help dissolve stains on teeth<sup>7</sup>.

In addition to direct consumption, apple is also widely consumed in the form of juice drinks. That is an apple with a specific weight (g) is mixed with water in a given volume as well (ml) to produce a homogeneous solution.

## Methods of research

The research design that used in this study were true experimental pre and post test control group design using elements of the permanent maxillary premolar tooth from extraction indications orthodontic treatment, free of caries and hypoplasia as a sample of 12 pieces, divided into 2 groups. The first group as a control group with 100 ml distilled water immersion. The second group as the treatment group using apple juice marinade with a concentration of 75% and consists of three subgroups of observations the tooth surface before soaking the coffee solution

(IIa), observation of the tooth surface after immersion solution of coffee (IIb) and the observation of the tooth surface after immersion in coffee solution and then soaked in apple juice concentration of 75%. (IIc). Samples of tooth element has immersed first in a solution of coffee during 2 weeks until discoloration then immersed according to the group for 2 weeks (3x @ 5minutes a day), and then measured the color changes of teeth.

The results were statistically analyzed using SPSS program for Windows 16.00 with a significance level of 0.05 ( $p = 0.05$ ).

With the method of data analysis using Paired T-test and Independent t-tests.

## Result and discussion

The results with Paired T-test showed a significant effect on the group before treatment and after treatment with ( $p < 0.05$ ). Independent T-test results showed a significant difference between the control group soaked in 100 ml distilled water to the treatment group, marinated in apple juice concentration of 75% .

**Table 1. Color measurement results in the group I, IIa, IIb and IIc**

Element	before immersion (group IIa) (mV)	after immersion in coffee solution (group IIb) (mV)	after immersion in apple juice 75% (group IIc) (mV)	After immersion in 100 ml distilled water (group I) (mV)
1	194,98	180,86	190,34	112,96
2	136,76	128,84	144,4	94,40
3	150,34	145	152,48	100,41
4	139,5	127,3	132,92	96,52
5	165,14	159,44	155,48	100,12
6	100,88	98,34	107,72	98,28

## Conclusion

Apple juice (*Malus sylvestris Mill*) has the ability to whiten the enamel surface of teeth that changes color from a solution of coffee soaked in vitro. Soaking teeth with 75% apple juice is able to restore the color of the enamel surface that changes color returning to the original color, before soaked in the coffee solution.

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