

**Inhibition Ability Test External Stain Commercial Miswak Extract Toothpaste,  
Commercial Miswak Extract Whitening Toothpaste and Commercial  
*Pepsodent Whitening* Toothpaste on Acrylic Resin Block**

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**Abstract**

Discoloration of teeth is a dental problem associated with aesthetic issues. Extrinsic discoloration is a common cause of tooth discoloration. The most common cause is derived from the chromogenic materials from food and beverages. There was variation in the type of commercial toothpaste that has the ability to inhibit the external stain such as whitening and miswak in their formulation. **Objective:** The purpose of this study was to determine the effectiveness of the use commercial miswak extract toothpaste, commercial miswak extract whitening toothpaste and commercial *Pepsodent Whitening* toothpaste inhibit external stain. **Method:** This research method using laboratory experimental in vitro using randomized pre post test design. Eighty acrylic resin blocks were randomly divided into four groups, consisting of a group *Siwak-F* Toothpaste (G1), *Siwak-F Whitening* toothpaste (G2), *Pepsodent Whitening* toothpaste (G3), Negative control (G4). Spectrophotometer and index lobene were used for tools and assessment of discoloration acrylic resin blocks. **Result:** Statistical test results showed that there were differences external stain inhibition of the four different groups (Kruskall Wallis,  $P < 0.05$ ). **Conclusion:** The conclusion of this study show that *Siwak-F Whitening* toothpaste is the most effective formulation for inhibiting external stain in chemical.

**Keywords:** External Stain, Commercial Miswak Extract Toothpaste, Commercial Miswak Extract Whitening Toothpaste and Commercial *Pepsodent Whitening* Toothpaste

**Uji Kemampuan Penghambatan *Stain* Eksternal Pasta Gigi Ekstrak Siwak  
Komersil, Pasta Gigi Ekstrak Siwak Pemutih Komersil dan Pasta Gigi  
*Pepsodent* Pemutih Komersil Pada Balok Resin Akrilik**

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**Abstrak**

Perubahan warna gigi merupakan masalah kedokteran gigi yang sering ditemukan berhubungan dengan masalah estetik. Perubahan warna ekstrinsik merupakan penyebab umum dari perubahan warna gigi. Sumber yang paling umum berasal dari bahan kromogenik yakni dari makanan dan minuman. Terdapat variasi jenis pasta gigi komersil yang memiliki kemampuan untuk menghambat *stain* eksternal *stain* eksternal seperti kandungan pemutih dan ekstrak siwak didalamnya. **Tujuan** dari penelitian ini adalah mengetahui efektivitas penggunaan pasta gigi ekstrak siwak komersil, pasta gigi ekstrak siwak pemutih komersil dan pasta gigi *pepsodent* pemutih komersil dalam menghambat *stain* eksternal. **Metode** penelitian ini menggunakan eksperimental laboratorik secara *in vitro* yang menggunakan metode *randomized pre post test design*. Delapan puluh balok resin akrilik dibagi secara random dalam empat kelompok, terdiri dari kelompok Pasta Gigi Siwak F (K1), Pasta Gigi Siwak-F Whitening (K2), Pasta Gigi Pepsodent Whitening (K3), Kontrol Negatif (K4). Digunakan alat spectrophotometer dan indeks lobene sebagai penilaian perubahan warna balok resin akrilik. Hasil uji statistik menunjukkan terdapat perbedaan penghambatan *stain* eksternal antara keempat kelompok yang berbeda (Kruskall Wallis,  $p < 0.05$ ). Kesimpulan dari penelitian ini adalah Pasta Gigi *Siwak-F Whitening* merupakan pasta gigi yang paling efektif menghambat *stain* eksternal secara kimiawi.

**Kata Kunci** : *Stain* eksternal, Pasta gigi ekstrak siwak komersil, Pasta gigi ekstrak siwan dan pemutih komersil, Pasta gigi *pepsodent* pemutih komersil

## **Introduction**

Tooth discoloration is the reason why patients go to the dentist (Khozeimeh, et al., 2008). Discoloration of teeth in esthetic look unattractive and can lead to psychological trauma to the patient (Manuel, et al., 2010).

Extrinsic discoloration is a common cause of tooth discoloration. The most common source is derived from the chromogenic materials from food, drink, drugs and tobacco. The type of beverage that became a source of external stain mainly are tea, coffee and red wine. It can be improved with the use of oral antiseptics such as chlorhexidine and cationic polyvalent metal salt including tin and iron (Pontefract, et al., 2004).

Tea is one of beverage almost the entire population of the world loved it. The number of drinks consumed of tea is second rank after the regular drinking water. Black tea is the most widely type of tea drunk by the nations of the world (Yeni 2009).

Nowdays, there are a variety of whitening toothpastes on the market. The toothpaste is formulated to control extrinsic stain (Sharif, et al., 2000). Beside whitening toothpaste that come on the market, now there are toothpaste with herbal ingredients include: Aloe vera, eucalyptus, Miswak, and betel leaf (Pratiwi, 2005).

Miswak is known to have the effect of removing stains and other pharmacological properties. Miswak (*Salvadora persica*) consists of trimetyl

amines, silica, alkaloids, chlorine, fluoride, saponins, tannins, resins, sulfur, vitamin C and plant sterols (Almas and Al-Zeid, 2004).

## Methods

Research design. The methodology of this study is an experimental laboratory in vitro study that uses methods of randomized pre post test design. Subjects were divided into 4 groups. G1 (*Siwak-F* toothpaste group), G2 (*Siwak-F whitening* toothpaste group), G3 (*Pepsodent whitening* toothpaste group), G4 (Negative control group). The standard operating procedure for each experimental was as follows :

1. The fourth groups were placed in unstimulated saliva, for 2 min and removed into distilled water for 30 s.

2. Placed in 2.0% chlorhexidine solution for 60 s and removed into distilled water for 60 s.
3. Placed in a standard tea solution for 60 s
4. Left dry until the next cycle.

At the end of one cycle, the blocks were read on the spectrophotometer for getting a baseline value. Daily cycles were performed 8 days at 08.00 and 15.00. Interventions within the staining procedure were toothpaste slurries prepared by thoroughly mixing 75 g of toothpaste in 300 ml of distilled water using a rotary mixer (water was used as the control intervention). The exposure of specimens to the slurries was for 120 s. Within the staining cycle, these interventions were used after saliva exposure but before chlorhexidine

soaking. The standard tea solution was prepared by boiling 7 mg of tea in 700 ml of distilled water. The variations to the standard procedure were:

1. Timing of the interventions.
2. Temperature of the standard tea and chlorhexidine solutions.
3. Concentration of the tea
4. During the post cycle aqueous or dry environment
5. Duration of chlorhexidine and tea exposure.

Unless otherwise stated, the interventions were:

1. Miswak toothpaste product  
*Siwak-F*
2. Miswak and whitening toothpaste product *Siwak-F Whitening*

3. Whitening toothpaste product  
*Pepsodent Whitening*

4. Aquadest (negative control)

After the each cycle, specimens were kept in a dry environment. Optical density were record after the 15.00 cycle in day 1, day 3, day 5 and day 8 using spectrophotometer (Shimadzu, Japan). Lobene index were record after the 15.00 in the last day.

#### *Statistical analyzed*

Data of spectrophotometer were statistically analyzed using Kolmogrov-Smirnov normality test, followed by Kruskal Wallis non parametric test to determine whether there are groups of data that have significant differences. Data of lobene index were showed using graph.

## Result

The result of the study is figured as follows :

**Table 1. The normality test using Kormogorov-smirnov normality test**

		Tests of Normality					
		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Kelompok	Statistic	df	Sig.	Statistic	df	Sig.
Hari1	Siwak-F	.156	20	.200 *	.903	20	.048
	Siwak-F Whitening	.168	20	.142	.931	20	.165
	Pepsodent Whitening	.223	20	.010	.897	20	.036
	Kontrol Negatif	.222	20	.011	.819	20	.002
Hari3	Siwak-F	.115	20	.200 *	.971	20	.779
	Siwak-F Whitening	.155	20	.200 *	.968	20	.714
	Pepsodent Whitening	.164	20	.162	.953	20	.418
	Kontrol Negatif	.206	20	.025	.897	20	.037
Hari5	Siwak-F	.110	20	.200 *	.955	20	.451
	Siwak-F Whitening	.104	20	.200 *	.964	20	.626
	Pepsodent Whitening	.182	20	.081	.902	20	.045
	Kontrol Negatif	.244	20	.003	.781	20	.000
Hari8	Siwak-F	.155	20	.200 *	.936	20	.198
	Siwak-F Whitening	.197	20	.040	.911	20	.067
	Pepsodent Whitening	.109	20	.200 *	.955	20	.458
	Kontrol Negatif	.212	20	.019	.810	20	.001

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The result of Kolmogorov-smirnov normality test showed that the data were distributed not normality (p<0.05). The Kruskal Wallis test was subsequently conducted to observe the differences among the four groups.

**Table 2. Kruskal Wallis non parametric test**

**Ranks**

	Kelompok	N	Mean Rank
Hari1	Siwak-F	20	49.30
	Siwak-F Whitening	20	38.90
	Pepsodent Whitening	20	39.30
	Kontrol Negatif	20	34.50
	Total	80	
Hari3	Siwak-F	20	39.00
	Siwak-F Whitening	20	35.98
	Pepsodent Whitening	20	51.13
	Kontrol Negatif	20	35.90
	Total	80	
Hari5	Siwak-F	20	41.23
	Siwak-F Whitening	20	33.90
	Pepsodent Whitening	20	49.93
	Kontrol Negatif	20	36.95
	Total	80	
Hari8	Siwak-F	20	44.65
	Siwak-F Whitening	20	22.60
	Pepsodent Whitening	20	52.00
	Kontrol Negatif	20	42.75
	Total	80	

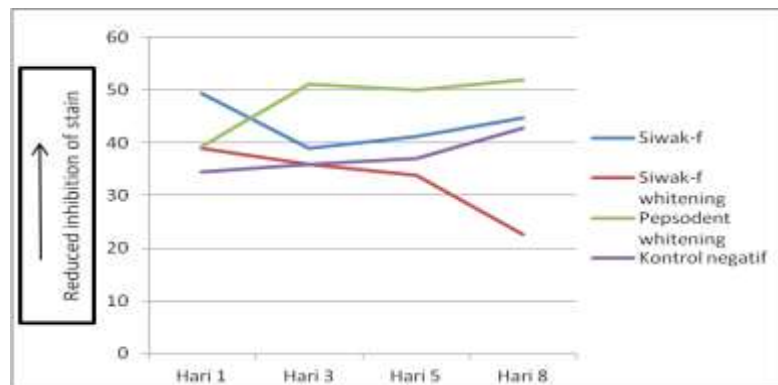
**Test Statistics<sup>a,b</sup>**

	Hari1	Hari3	Hari5	Hari8
Chi-Square	4.350	5.807	5.390	17.591
df	3	3	3	3
Asymp. Sig.	.226	.121	.145	.001

a. Kruskal Wallis Test

b. Grouping Variable: Kelompok

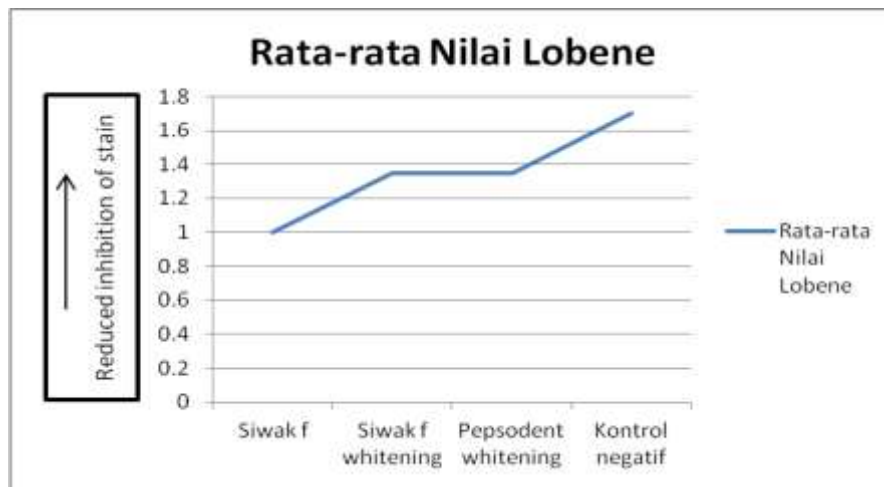
**Figure 1. Mean rank value of *Kruskal Wallis Test***



The difference of between four groups  $p=0.001$  ( $p<0.05$ ) that stastically was significant. To determine the effective group that inhibits the external stain, can be seen from the mean rank values showed in Table 3 and Graph 1. The group who has lower mean rank values than the other groups, indicating that the group

is more effective at inhibiting the external stain. On the eighth day, *Siwak-F Whitening* Toothpaste group has the lowest mean rank values than the other groups, it indicates that *Siwak-F Whitening* Toothpaste group is the most effective at inhibiting external stain.

**Figure 2. The average of lobene index value**



From Figure 2, it can be seen that the *Siwak-F* Toothpaste group has the the

lowest average value of lobene index compared with the other treatment



groups. It means that in visual assessment, acrylic resin block of *Siwak-F* Toothpaste group is most clearest blocks for external stain attached to the blocks slightly compared to the other treatment group had greater average value of lobene index. It is proved that *Siwak-F* Toothpaste is the most effective at inhibiting the external stain of assessed acrylic resin blocks in visualization.

### **Discussion**

From the results of this study there is a difference between the results of the assessment with the spectrophotometer and the results of visual assessment with lobene index. Assessment with the spectrophotometer showed that *Siwak-F Whitening* Toothpaste group is the

most effective at inhibiting external stain, whereas assessment of lobene index showed that *Siwak-F* Toothpaste group is most effective at inhibiting external stain. The difference is due to assessment lobene index is a visual assessment subjectivity and there is no standard measurement of color change, so the assessment just based on estimates of an observer.

The results of the research assessment using spectrophotometer and lobene index found that toothpaste contains miswak is effective in inhibiting external stain in acrylic resin blocks . The mechanisms involved the process of external stain inhibition by miswak extracts is not known certainly , but the mechanism of inhibition of external stain in this study is a chemical process .

Miswak extract containing chloride that function removes stain on teeth ( Almas , 2002) , chloride is a strong oxidizing agent that can release oxygen from other compounds ( Maran , 2006) . This oxidizing material has the ability to destroy the dye molecules through reaction with free oxygen that is released , so that the color be neutral and the bleaching effect ( Armalia , 2002 cit . Feinman , 1987; Goldstein and Garber , 1995) . Another component that contained in miswak is silica, an abrasive material function to remove stains and whiten the teeth ( Al Sadhan and Almas , 1999) .

*Pepsodent Whitening* Toothpaste that contain whitening perlite, statistically in this study

showed that the chemical does not have the ability to inhibit the extrinsic stain on acrylic resin blocks. This is different with the content of whitening E-Pthalimido peroxyhexanoic acid combined with miswak on *Siwak-F Whitening* Toothpaste, which is shown have the ability to inhibit external stain chemically.

### **Conclusion**

Based on the results of the study, statistically significant value obtained on the eighth day of  $p = 0.001$  ( $p < 0.05$ ), which means there are significant differences between the four test groups. Showing from the mean value of Kruskal Wallis rank test, *Siwak-F Whitening* Toothpaste is the most effective at inhibiting external stain chemically.