

# The Effectiveness of Oral Cleaning Method on Coated Tongue

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## Abstract

For the purpose of conducted to provide a basis for developing a tongue cleaning method by comparing which method is most effective commonly used to remove coated tongue.

Using each tool, wipe a total of 3 times from the back of the tongue to the front and instruct all experimenters to gently rinse their mouth with water.

After obtaining the average of absorbance measured in each case, paired t-test compares the effects of removing lingual bacterial membranes before and after the use of the tongue debris, and compares the means between groups with on-way ANOVA and post-test.

According to the results of this study, there was a difference in absorbance of tongue before and after tongue cleaning according to the tongue cleaning methods, the most effective methods was in the order of gauze, tongue cleaner, and toothbrush, but this was not statistically significant.

Any of the tongue cleaning methods tongue cleaner, gauze, and toothbrush can be regarded as important way to manage bad breath by removing the coated tongue in the correct way.

**Keywords:** coated tongue, tongue cleaner, gauze, toothbrush, method

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## Introduction

Health is a basic right for all human beings to lead a happy life, but it is also an optional right that can be obtained through effort. So, people are always aware of the importance of health and live endlessly to stay healthy surface (Kim S. K. I *et al.*, 2014). As society's socioeconomic level has recently changed, interest and awareness of oral health have risen, and as such, it has become an

important role in improving whole body health and quality of life (Ji M. G. *et al.*, 2012; Kim J. J *et al.*, 2012). Among them, bad breath has been reported as a factor deteriorating health by adversely affecting social activities. With this as a major complaint, the public's interest in bad breath is gradually increasing, and the number of patients visiting the dentist is increasing. 50-65% of the population has agonized or suffered from bad breath surface (Jo J. W. *et al.*, 2003), and the prevalence of bad breath in adults is 25-50%, of which about 25% of them have severe bad breath, which is chronic enough to affects social functioning surface (Han J. S. *et al.*, 2011).

Bad breath is a social, psychological, and emotional anxiety that makes it difficult to smooth interpersonal relationships due to lack of confidence as well as social life. It is a symptom that is urgently required to be managed not only as an indicator of oral health and general health, but also as a factor that has an important influence on promoting social life and mental health surface (Heo H. Y. *et al.*, 2005).

The occurrence of unpleasant bad breath can occur from both internal and external factors, but the majority (about 80-90%) of bad breath patients who feel serious are caused by oral causes surface (Miyazaki, H *et al.*, 1995).

In particular, oral problems such as coated tongue, periodontal disease, and deep dental caries that lead to bad breath are the main cause surface (Donaldson, A. C *et al.*, 2007). Among them, tongue debris located on the back of the tongue, which acts as a reservoir for food residues and microorganisms, was the main cause of bad breath surface (Loesche, W. J *et al.*, 2002). It was confirmed through a study that 50% of bad breath, which causes unpleasant sensation, is reduced when coated tongue is removed surface (Yaegaki, K. *et al.*, 1992).

As an effective method of removing such bad breath, tooth brushing and tongue brushing are used as representative methods surface (Kim S. K. I *et al.*, 2014). Severe bad breath can lead to a patient's behavioral restrictions or social avoidance, and can affect self-confidence, self-image, and body image surface (Han J. S *et al.*, 2011).

However, existing research data consisted only of basic treatments to reduce bad breath and studies on bad breath factors surface (Morris PP. *et al.*, 1949). Recently, a comparative paper on the effect of reducing bad breath through tooth brushing, tongue cleaning devices, candy and gum has been published surface (Nam S. M. *et al.*, 2012). It was reported that there was a reduction effect in the group of tooth brushing, eating candy, and chewing gum, but there was no significant difference in the group using the tongue cleaning device.

Therefore, this study was conducted to provide basic data for research on a more effective method of removing the coated tongue membrane in the future by comparing the effects of oral hygiene management products.

## **Materials and Methods**

## Research subject and period

This study recruited subjects from university students attending D University in Busan, and started the study with volunteers who voluntarily participated in the study. The researcher fully explained the research purpose and participation method to the subjects, and 30 university students with an average of 23.8 years old were selected as final subjects.

## Research method and evaluation

### Liquid culture medium production

- 1) Using a measuring cylinder, add 100 ml of distilled water to a glass bottle.
- 2) Using a disposable weighing dish, measure 1.6 g of Difco™ Nutrient Broth into a balance and place it in a glass bottle.
- 3) 100 ml of distilled water is added to the glass bottle using a measuring cylinder.
- 4) Cover the lid with foil and attach sterile tape.
- 5) After the lid is locked, shake it to mix, slightly open the lid and autoclave.

## Experimental materials and instruments

- 1) Tongue cleaning products

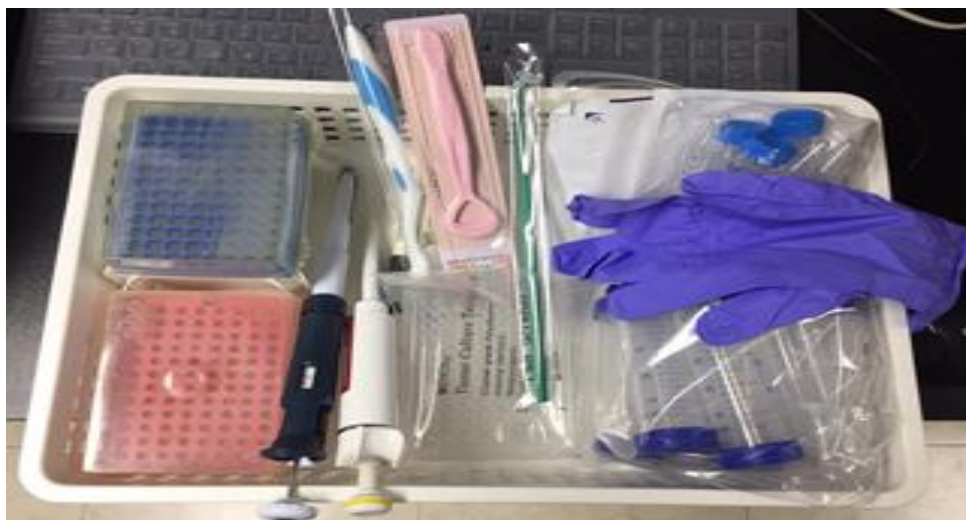
Prepare 10 tongue cleaners (242 tongue cleaner, Miso International), toothbrush (2080 original, Aekyung), gauze (apple gauze) of the same product each



**Figure 1. Tongue cleaning tool**

- 2) Other experimental equipment

Prepare a scraper, micro pipette, micro pipette tip, 50 ml conical tube, latex gloves, quartz cell, and uv/vis spectroscopy to collect the bacterial membrane in figure 2.



**Figure 2. Other experimental equipment**

## **Research Method**

### **1) Tongue environment under the same conditions**

48 hours Before the experiment, tongue brushing is not performed when brushing tooth, to accumulate the bacterial membrane on the coated tongue. During the experiment, the tongue is divided into two equal parts from side to side. The left side of the tongue is not cleaned and the right side is cleaned by the method of removing the lingual bacteria. Subjects were managed to not to put the tongue back into the mouth as the bacteria can get back on the tongue if the tongue is closed during removal and collect the coated tongue's bacterial membrane.

### **2) Tongue cleaning**

Every experimenter washes his/her tongue with gauze, toothbrush, and tongue cleaner, respectively, during the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> periods of the experiment every two days.

Using each tool, wipe a total of 3 times from the back of the tongue to the front and instruct all experimenters to gently rinse their mouth with water.



Use a scraper



Use a tongue cleaner



Use a toothbrush



Use a gauze

**Figure 3. Tongue cleaning**

### Experimental process

- 1) The lingual bacterial membrane harvesting agent pulls the tip of the tongue of subjects who have accumulated lingual bacterial membrane.
- 2) By using scraper, the lingual bacterial membrane on the left side is scraped three times at a constant intensity from the posterior part of the tongue to the anterior part.
- 3) The right lingual bacterial membrane is removed by the lingual bacterial membrane removal method (gauze, toothbrush, tongue cleaner).
- 4) The right side of the tongue is scratched three times at a constant intensity from the posterior to the anterior portion of the tongue with a scraper.
- 5) The scraper scraping the bacterial membrane is placed in a 50 ml conical tube with 10 ml Nutrient medium, and the scraper is hit 10 times on the wall of the conical tube to drop the bacterial membrane.
- 6) The 50 ml conical tube is incubated in the 37°C incubator thermo for 48 hours.
- 7) A certain amount (100 $\mu$ l) is sucked with a pipette from the tube containing the cultured bacteria and added to 4/5 of the quartz cell.
- 8) A quartz cell is placed in uv/vis spectroscopy to measure absorbance at a wavelength of 600nm.

### Statistics processing

After obtaining the average of absorbance measured in each case, paired t-test compares the effects of removing lingual bacterial membranes before and after the use of the tongue debris, and compares the means between groups with on-way ANOVA and post-test.

## Results and Discussion

### Absorbance before and after using the tongue cleaning tool

The difference in absorbance before and after using the tongue cleaning tool, the absorbance of the control group without the tongue cleaner was 0.11, the absorbance of the experimental group using the tongue cleaner was 0.07, and the difference in absorbance was  $0.04 \pm 0.09$  which was a significant difference. The absorbance of the control group without gauze was 0.16, the absorbance of the experimental group with gauze was 0.12, and the difference in absorbance was  $0.04 \pm 0.12$ , showing a significant difference. The absorbance of the control group without a toothbrush was 0.1, the absorbance of the experimental group using a toothbrush was 0.10, and the difference in absorbance was  $0.01 \pm 0.05$ , showing a significant difference ( $p < 0.05$ ) in Table 1.

**Table 1: Absorbance before and after using the tongue cleaning tool**

Sort	Absorbance	Absorbance difference (M $\pm$ SD)	t	P
Tongue cleaner control group	0.11 $\pm$ 0.07	0.04 $\pm$ 0.09	4.27	0.000
Tongue cleaner experiment group	0.07 $\pm$ 0.06			
Gauze control group	0.16 $\pm$ 0.10	0.04 $\pm$ 0.11	4.17	0.000
Gauze experiment group	0.12 $\pm$ 0.07			
Toothbrush control group	0.11 $\pm$ 0.04	0.01 $\pm$ 0.05	2.25	0.026
Toothbrush experiment group	0.10 $\pm$ 0.05			

### Difference in absorbance according to tongue cleaning method

Tongue cleaners, gauze, and toothbrushes all showed significant differences in absorbance before and after use ( $p < 0.05$ ) in Table1. In the difference in absorbance according to the three tongue cleaning methods, the tongue cleaner was highest at 0.032 but there was no statistically significant difference ( $p > 0.05$ ) in Table2. And as a result of examining the differences between groups by post-test, there was no difference in absorbance between all tongue cleaning methods.

**Table 2: Difference in absorbance according to tongue cleaning method**

Sort	Absorbance	F	P
Tongue cleaner	0.030 $\pm$ 0.035	0.914	0.413
Gauze	0.032 $\pm$ 0.088		
Toothbrush	0.001 $\pm$ 0.021		

#### **4. Conclusion**

Comparing the effect of tongue cleaning tools to remove it in college students in some areas of Busan. To do this, the absorbance of the coated tongue membrane was measured before and after tongue cleaning.

Among the oral hygiene care products used for the removal of the lingual bacterial membrane, three tools were selected: tongue cleaner, gauze, and toothbrush. It was confirmed that there were significant differences in each method when comparing the difference in absorbance by removing the lingual bacterial membrane by selecting three tools. However, the absorbance according to the tongue cleaning method was different in the order of tongue cleaner, gauze, and toothbrush, but this was not statistically significant. Therefore, using any of the tongue cleaning tools – tongue cleaner, gauze, toothbrush – it is important to remove the lingual bacterial membrane in an accurate and correct way.

As a limitation of this study, first, there was a limitation in retrieving the lingual bacterial membrane with the same intensity. Because the experiment was done by a person, not a machine, when collecting the lingual bacterial membrane, the conditions were different. Second, it was not possible to completely control the living environment, such as the diet and lifestyle, and the intensity of brushing. Because they were not all in the same condition, errors between subjects were inevitable. Finally, there is a limitation that generalization is not possible because the screening process of the study subject was randomized and the screening of subjects was not possible through accurate and objective results.

Nevertheless, this study is meaningful as the first study to compare the effect of removing the lingual bacterial membrane according to the tongue cleaning tool. This study is expected to serve as a springboard for a follow-up study comparing the effect of removal of the lingual bacterial membrane according to the oral hygiene products. In the follow-up studies, it is considered that a supplementary point is needed to confirm the effect of removing the lingual bacterial membrane according to the method of cleaning the tongue, not in one-time experiment but several times, and to prepare a method for maintaining it.

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