

Tongue Scraping: A Reduction of Bacterial Count in the Oral Cavity

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Abstract - This study determined the effects of tongue scraping after tooth brushing on the oral cavity among college students. This study aimed to analyze and determine the various factors influencing/affecting the use of tongue scraper on the oral cavity; determine the average bacterial colony count before and after tooth brushing; test the significant difference in the reduction of bacterial colony count between tooth brushing alone and tongue scraping after tooth brushing. The study utilized experimental or a quasi-experiment as well as descriptive survey method to determine the reduction of bacterial colony after using tongue scrapers. Most experiments tend to fall in between the strict and the wide definition. The result revealed there is a significant reduction of bacterial colony after tongue scraping among all respondents rather than tooth brushing alone. It is possible that the remains of the bolus from the food can still stay on the dorsum of the tongue even after tooth brushing. The tongue dorsum has a rough surface that snares miniscule food remains which could decay to form plaque and could lead to halitosis. The significant decrease lead to the rejection of the null hypothesis that there is no reduction of bacterial colony in tongue scraping.

Keywords: *oral cavity, dental hygiene, dorsum, tongue scraping*

INTRODUCTION

Tongue is a small but powerful organ of the body since it performs the function of taste, speech, mastication and deglutition. Hence, the need for tongue cleaning has become a part of daily oral hygiene. Tongue cleaning being an ancient habit is practiced for centuries in many Eastern and Oriental cultures, though not very popular in the Western civilizations. It has been advocated to improve oral malodor and to reduce reinfection of periodontal niches by eliminating tongue coating and/or reducing putrefaction by bacteria. To prevent putrefaction on the tongue

dorsum, tongue cleaning has been advocated to reduce the amount of coating and the bacterial load on this surface (Gondhalekar, *et.al.*, 2005).

It is estimated that approximately 85% of all halitosis cases have their origin within the mouth; of these, 50% are caused by tongue residues. Previous studies have established that hydrogen sulfide and mercaptans are the primary components of halitosis. Thus, tongue cleaning gains importance as a means of halitosis management. Due to its location and functions, the tongue is one of the most important anatomic structures in the oral cavity. Bordas, *et.al.*(2008). However, knowledge in regards to its role and implication in oral health and disease is scared. Moreover, although the dorsum of the tongue seems to harbor one of the most complex microbiological niches in human ecology, knowledge of the role of tongue flora in health and disease is also very limited by Weindoop (2003).

Researchers studied literature examining the effects of using tongue scrapers to clean the tongue, rather than only using a toothbrush to clear volatile sulfur compounds, or VSC, accumulated on the tongue. They found that using a tongue scraper showed a significant difference in reducing VSC levels produced when bacteria and amino acids interact to produce bad breath, but only for a short time. Alison (2013).

Tongue scraper has the correct shape and hardness to be able to lift the coating of food debris, dead cells and fungi that form on it. The bacteria that grows on in your mouth, is the cause of bad breath. According to Wekelo, (2013) tongue scraping reduce bad breath, as oral bacteria lives in the crevices of the tongue and most bad breath comes from the bacteria at the back of the tongue, which is difficult to remove with a toothbrush. Enhance your taste buds by opening up the pores in your tongue. Without proper removal of mucus, taste buds can become blocked and can cause an inability to recognize the taste of food as well. It also Avoid toxins being reabsorbed in your body. By doing this first thing in the morning, you can eliminate the toxins immediately and boost your immune system.

This study starts from the view that tongue scraping will be useful in maintaining a good oral hygiene. The view is that tongue scrapers are straightforward and comfortable to use. Cleaning the tongue is quickly and easily accomplished. This study is conducted to assess the effectiveness of tongue scraping after tooth brushing in reducing bacterial count in the oral cavity.

In reducing bacterial count in the oral cavity, the possibility of having oral halitosis will be low and this will be promoting a good oral hygiene. This study is conducted in consideration that using tongue scraper maybe time consuming but it will surely benefit in many aspects.

OBJECTIVES OF THE STUDY

This study will determine the effects of tongue scraping after tooth brushing on the oral cavity in the respondent of Lyceum of the Philippines University – Batangas City, from Pre-Dental 2 students of College of Dentistry.

More specifically, it will present profile of the respondents as to their age, gender, family income and social history. This study aims to analyze and determine the various factors influencing/affecting the use of tongue scraper on their oral cavity such as brand of toothpaste, the kind of toothbrush that they use, if they are using mouthwash, tongue scraper and dental floss, if he/she has monthly dental visit, the frequency or time of tooth brushing and the duration of tooth brushing. It also determines the average bacterial colony count before and after tooth brushing. It also aims to determine if there was a significant difference in the reduction of bacterial colony count between tooth brushing alone and tongue scraping after tooth brushing.

METHODS

Research Design

The researchers utilized experimental or a quasi-experiment to determine the reduction of bacterial colony after using tongue scrapers. Most experiments tend to fall in between the strict and the wide definition. Additionally, descriptive survey methods were used to gather information that can be utilized for the conclusion on the target audience through data analysis.

Participants of the Research

The participants involved are 20 pre-dental students who were enrolled in 1st semester at LPU-Batangas, 16 to 20 years old, either male or female, not medically compromised, specifically with no periodontal diseases, no gastric conditions; no tonsillitis; not chain smokers and those with no hard or soft oral tissue lesions that may alter the results.

Data Gathering Instruments

The survey is a self-made questionnaire and was used as the main data gathering instrument for this study. It is divided into two parts namely: respondent's demographic profile and respondent's dental demographic profile.

The Pour-Plate method was used to separate one species of bacteria to another, in such a manner that one of the plates poured will have an optimum number of organisms to provide good isolation. Sub culturing technique is the aseptic transfer of micro-organisms from a culture to fresh medium. The freshly inoculated medium is then incubated at the temperature appropriate for growing the organism.

Quebec bacterial colony counter was also used for the bacterial colony count and the researcher made a record sheet to examine the following issues; profile of the patient, bacterial colony count before tooth brushing, bacterial colony count after tooth brushing and bacterial colony count after tongue scraping following tooth brushing procedure.

Data Gathering Procedure

After the accomplishment of the final draft of the questionnaire informed consent was given to Dr. Edgardo Panopio, Dean of College of Dentistry, for the approval of the waivers that were distributed later on to our subjects, pre-dental students of Lyceum -Batangas.

Informed consents were distributed to each of the pre-dental students of Lyceum- Batangas as the waiver for them to participate in our experiment and also as an acknowledgement of their participation. Data collection was conducted on January 15, 2016

Preliminary Preparation

The patients of this research were screened based on the inclusion criteria and oral examinations were undertaken to screen the teeth for the following: (1) number of teeth present (2) presence of dental disease and (3) medical history as taken to know the status of patient's health. The letter was addressed to the qualified patient who in turn was made to sign the consent form.

Actual Data Gathering

Before tooth brushing, saliva was collected from the participants of the study. The collected saliva was placed in a

sterile Test tube. The melted nutrient agar was poured into the respective petri dish. Using the pour plate method, we combined the saliva collected and the melted nutrient agar with a specific ratio of 1:1000. The 1 mL of saliva and 999 mL of NSS or Normal Saline Solution were swirl to mix well, rotated gently, or moved back and forth (first N-S, then NW-SE, then NE-SW), to ensure that the culture and medium are thoroughly mixed and the medium covers the plate evenly. We let it cool to solidify (without disturbing). The specimen was incubated for 2 to 3 days in the microbiology laboratory.

After that, we let the participants brush their teeth using a brand A tooth brush, and Brand A tooth paste, we instructed them of proper method of tooth brushing. Again, saliva was collected from the participants and repeats the same procedure above.

Saliva was collected from the participants of the study for the third time after they used a tongue scraper, and perform again the pour plate method to have proper isolation of bacteria. A typically temperature employed is 45°C. This prevents premature solidification of the agar while at the same time, ideally, does not excessively overheat organisms.

Tooth brushing Method

The respondents were instructed to brush their teeth using a soft bristle, Brand A toothbrush and Brand A toothpaste, following the succeeding procedures:

- a) Brushing was started on the facial surface of the most posterior tooth in the maxillary arch.
- b) The sequence of brushing was around the arch from the right molar region to the right premolars, to the anteriors, to the left premolars and finally to the left molar regions.
- c) Brushing proceeded on the maxillary lingual surfaces of the left posterior segment, brushing each surface until reaching the right posteriors.
- d) The same sequence was repeated in the mandible.
- e) After tooth brushing, all maxillary and mandibular lingual and facial surfaces, the occlusal surfaces in each quadrant were brushed.
- f) Rinse and gargle with water. After the tooth brushing procedure, saliva was collected from the participants. The collected saliva was placed into a sterile test tube. The suspension was poured into a sterile petri dish. A melted nutrient agar was poured based into a respected petri dish and

incubated 2 to 3 days in the microbiology laboratory for the growth and development of bacteria.

Tongue scraping method after tooth brushing

After the tooth brushing procedure and collection of saliva, tongue scraping method was done following the procedures below:

- a. The participants were instructed to open his/her mouth and extend his tongue.
- b. The participants held the handle of a plastic single strip type tongue scraping using both hands. The U-shape end of the tongue scraper was placed at the back of the tongue. The tongue was gently scraped forward with one long continuous stroke removing the odor- causing bacteria. The tongue cleaner was rinsed. This was done five times over the entire upper surface of the tongue.
- c. The patients were made to rinse and gargle with water.

After the tongue scraping procedure, saliva was collected from the participants. The same microbiologic procedure was done after the collection of the specimen.

Data Analysis

To determine the bacterial colony count using the Quebec colony counter:

1. Select the plates that have no fewer than 30 nor more than 300 colonies for your count.
2. Place the plate on the Quebec colony counter with lid removed. Start counting from the top of the plate, using the grid lines to prevent counting the same colony twice. Count every colony, regardless of how small or insignificant.
3. Calculate the ratios of the total volume / volume transferred and then multiply it by the colonies counted on the plate.

The average bacterial colony count before and after tooth brushing was determined by computing the mean. The same formula for the mean applies in determining the average bacterial colony count after tongue scraping. In cases wherein there were "too numerous to count (TNTC)" results in the bacterial colony count, the median was used instead of the mean as a measure of the average bacterial colony count before and after tooth brushing alone and tongue scraping after tooth brushing.

To determine if there was a significant reduction in bacterial count before and after tooth brushing, the dependent or paired t-test was used. Further, the independent t-test was used to determine if there was a significant difference in the reduction

of bacterial colony count between tooth brushing alone and tongue scraping after tooth brushing.

RESULTS AND DISCUSSION

Table 1. Percentage Distribution of the Respondents' Profile

Profile Variables	F	%
Age		
16 years old	1	5.00
17 years old	9	45.00
18 years old	8	40.00
19 years old	1	5.00
20 years old and above	1	5.00
Gender		
Male	2	10.00
Female	18	90.00
Civil Status		
Low income group	2	10.00
Average income group	16	80.00
High income group	2	10.00
Social History		
Non Smoker	20	100.00

Table 1 presents the distribution of the respondents' profile. It was observed that most of the respondents are 17 years old with a frequency of 9 or 45.00 percent, followed by 18 years old with 40.00 percent. 17 and 18 year olds are considered as early adolescent people, as they just stepped into their first years as a college students which makes them more conscious of their personal hygiene as compared to fresh graduated from high school 16 year olds that often neglects oral hygiene. The 19 and above year old students are more focused on their careers and doesn't have much time to think about their oral hygiene. As to gender distribution, male was dominated by female since it obtained the highest frequency of 18 or 90 percent while male got only 10 percent. Women has the higher tendency to be highly conscious about their personal hygiene compared to men. They are the ones will do anything just to improve their personal hygiene.

As to civil status, majority of the respondents belongs to the average or middle group (80%) while two (2) or 10 percent

were from lower and upper group. Average or middle income group are somewhat more mindful of their personal, specifically, oral hygiene as they are more conscious to their health than the lower group and want to join the higher group's standards so they have their mind set to be better than the lower income group and will find ways for the higher income group to accept them as to their personal hygiene.

Table 2. Percentage Distribution of the Respondents' Dental Profile

Profile Variables	F	Percentage (%)
Brand of toothpaste		
Colgate	15	75.00
Close-up	3	15.00
Happy	1	5.00
Unique	1	5.00
Kind of toothbrush		
Soft bristle	20	100.00
Using mouthwash		
Yes	11	55.00
No	9	45.00
Use of dental floss		
Yes	14	0.70
No	6	0.30
Monthly Dental visit		
Yes	6	70.00
No	14	30.00
Frequency of tooth brushing		
Twice a day	11	55.00
Thrice a day	7	35.00
More than three times	2	10.00
Duration of Tooth brushing		
Less than a minute	1	5.00
1 minute	3	15.00
2 minutes	12	60.00
More than 2 minutes	4	20.00

Table 3. Descriptive Statistics on the Bacterial Colony Count before and After Tooth Brushing (N=20)

	Minimum	Maximum	Mean	±SEM	±Std. Deviation
Before tooth brushing	1,040,000	1,980,000	1,599,500	61,338	274,312
After tooth brushing	420,000	850,000	620,500	26,432.4	118,209
After Tongue Scraping	180,000	560,000	300,500	28,437.1	127,175

As seen from the result, it was found out that there is a significant difference in the reduction of bacterial colony count between tooth brushing alone and tongue scraping after tooth brushing since the obtained p-value of 0.000 is less than 0.05 alpha level. Thus, the null hypothesis of no significant difference in the reduction of bacterial colony count between tooth brushing alone and tongue scraping after tooth brushing is rejected. It determines the average bacterial colony count before and after tooth brushing. It also aims to determine if there was a significant difference in the reduction of bacterial colony count between tooth brushing alone and tongue scraping after tooth brushing.

This only means that tongue scraping is effective in reducing bacteria. Because not all people have extra knowledge about tongue care. Some who are lucky enough to be explained by a proper dental hygienist are the ones who know about caring of the tongue. When people clean their mouth, they often forget about cleaning their tongue and not realizing that the tongue has much more bacteria than their teeth. If people often forget to clean their tongue, the bacteria that would stay on the tongue can lead to halitosis. The bacteria can release odorous gases which are possibly the causes of halitosis (Quirynen, et al. 2000).

As seen from the result of Table 4, it was found out that there is a significant difference in the reduction of bacterial colony count between tooth brushing alone and tongue scraping after tooth brushing since the obtained p-value of 0.000 is less than 0.05 alpha level. Thus, the null hypothesis of no significant difference in the reduction of bacterial colony count between tooth brushing alone and tongue scraping after tooth brushing is rejected.

Table 4. Difference in the Reduction of Bacterial Colony Count between Tooth Brushing Alone and Tongue Scraping After Tooth Brushing

	Mean	t-value	P-value	Interpretation
After Tooth Brushing	620,500	21.6	0.000	Highly Significant
After Tongue Scraping	300,500			

Legend: Significant at p-value < 0.05

This only means that tongue scraping is effective in reducing bacteria. Because not all people have extra knowledge about tongue care. Some who are lucky enough to be explained by a proper dental hygienist are the ones who know about caring of the tongue. When people clean their mouth, they often forget about cleaning their tongue and not realizing that the tongue has much more bacteria than their teeth. If people often forget to clean their tongue, the bacteria that would stay on the tongue can lead to halitosis. The bacteria can release odorous gases which are possibly the causes of halitosis.

Table 5. Bacterial Colony of the Respondents'

Sample #	Before tooth brushing	After tooth brushing	After Tongue Scraping
1	1,880,000	520,000	240,000
2	1,720,000	680,000	230,000
3	1,830,000	640,000	250,000
4	1,740,000	620,000	220,000
5	1,930,000	780,000	500,000
6	1,270,000	650,000	400,000
7	1,360,000	680,000	340,000
8	1,790,000	720,000	520,000
10	1,980,000	720,000	380,000
11	1,870,000	820,000	560,000
12	1,620,000	540,000	250,000
13	1,520,000	530,000	250,000
14	1,470,000	850,000	490,000
15	1,270,000	590,000	200,000
16	1,040,000	470,000	190,000
17	1,090,000	500,000	210,000
18	1,540,000	530,000	210,000
19	1,670,000	620,000	200,000
20	1,720,000	530,000	190,000
Average	1599500	620500	300500

As seen in Table 5, there was a significant difference from every respondent after using a tongue scraper rather than only using a toothbrush. It is possible that the remains of the bolus from the food we eat can still stay on the dorsum of the tongue even after tooth brushing. The tongue dorsum has a rough surface that snares miniscule food remains which could decay to form plaque. One of the major sites of bacteria in the oral cavity is on the tongue dorsum since it has the most complex bacterial niches in the human ecology (Christen,1978).

CONCLUSIONS

It was observed that most of the respondents are 17 years old; female; in the average income group; and non-smoker. With regard to respondents' dental profile, it was noticed that most of them used Colgate as their brand of toothpaste; all of them preferred soft bristle toothbrushes than any other kind of toothbrush. Most of the respondents used mouth wash and dental floss and self-assured that they do not have the need to visit their dentists monthly. As to the frequency of tooth brushing, they brushed their teeth twice a day with a duration of two minutes.

There is a significant difference in the reduction of bacterial colony count between tooth brushing alone and tongue scraping after tooth brushing. Tongue scraping after tooth brushing significantly reduced the bacterial colony count in the oral cavity of Pre-dental students.

RECOMMENDATIONS

The respondents are recommended to use tongue scraper after brushing their teeth. Tongue scraping suggests a proper way to have a quality dental health care, to prevent oral disease including Halitosis and systemic disorder due to poor oral hygiene. The Lyceum Supreme Student Council may consider to give a free Tongue Scraper as part of their School Program. The College of Dentistry may conduct a program that may help in oral hygiene practice to promote an oral health quality of life of a student. The college may conduct during Dental Awareness Week that the Department may invite a speaker about Tongue Scraper. Researchers highly recommend that tongue scraping are effective in imparting oral health knowledge and establishing good oral hygiene habits. With these positive findings, it is recommended that similar programs be supported and implemented with a larger sample size to determine the long-term effect of tongue scraping after tooth brushing and to improve the poor oral health situation.

Future researchers to conduct more in depth studies of which can further investigate the following: which will identify the bacteria present after tooth brushing and the types of bacteria when using Tongue Scraper; about the toothbrush with tongue cleaner at the back; and best design of tongue scraper should be used.

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