



Effect of Tongue Cleaning Methods and Oral Mutans Streptococci Level

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ABSTRACT

Introduction: Tongue scraping and brushing have been appreciated for hundreds of years but are still appreciated or used by the public. Scientific evidence has validated the need to practice habitual and tongue cleaning as part of daily home oral hygiene procedures.

Objective: To assess and compare the effect of tongue scraping and tongue brushing on oral Mutans streptococci level.

Materials and methods: A total of 20 healthy subjects aged 14 to 15 years were randomly selected. Flat plastic tongue scraper and Nylon multitufted small headed toothbrush are the two tongue cleaning devise used. Unstimulated salivary samples were obtained at 4 intervals from each individual. Salivary samples were inoculated on Mitis Salivary Agar Plate and Sorbital Broth was used for identification of Mutans streptococci group.

Results: Paired and unpaired 't' test were employed. Reduction in the Mutans streptococci level from 48.4×10^4 CFU and 38.3×10^4 CFU at baseline in tongue scraping and tongue brushing group respectively to 0.34×10^4 and 0.39×10^4 CFU after 7th day.

Conclusion: Both tongue coating removal methods evaluated were efficient in reducing mutans streptococci level. This implies that physical removal of the coating on the dorsum of the tongue is important and not the method used for the same.

Keywords: Tongue scraping, Tongue brushing, Tongue cleaning, Mutans streptococci.

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INTRODUCTION

The most common concept concerning individual health is the harmony of one's physical, mental and social well being. The simple absence of disease is not accepted as an indication of health. Tongue cleaning being an ancient habit,

is practiced for centuries in many Eastern and Oriental cultures, though not very popular in the Western civilizations.¹

Recent literature has shown that tongue cleaning leads to healthy oral environment.² 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. Gilmore and Bhaskar presented convincing evidence that plaque forming streptococci counts increased 10-folds after a week of not brushing the tongue.²

Tongue Care in Antiquity

Although largely an unknown practice in the west, tongue brushing and scraping have been used since antiquity and are still used by natives of Africa, Arabia and India. In the early civilizations, oral cleansing often had religious ritual significance. The Hindus regarded 'mouth as the gateway of the body, therefore it was necessary to keep it scrupulously clean'. The ancient Hindus used tongue scrapers with sharp curved edges made of gold, silver, ivory or tin.¹

The Mohammedans used Siwak wood brush once a day in a manner specified in the Koran. Prophet Mohammed said 'You shall clean your tongue for that is the way to praise God' and in Mohammedans the final stage of oral cleansing involved vigorous tongue brushing.¹

From 15th to 19th century, tongue cleaning was known to be practiced primarily by the affluent leisure class. More recently, during the 20th century, tongue cleaning was not a popular concept, and only a few references are mentioned in the literature.³

Why clean the Tongue?

Tongue, because of its surface texture contributes significantly in plaque formation and accumulation, has remained a neglected part in the oral cavity.⁴

The dorsal posterior part of most tongues has a coating of millions of microorganisms. Studies have shown that dorsum of the tongue is an important reservoir for mutans streptococci.⁵

Further more, studies have also found a significant correlation between the prevalence of mutans streptococci in saliva and its prevalence on the dorsum of the tongue.⁵

Mutans streptococci (MS) are one of the most virulent cariogenic pathogens in the oral cavity. Toothbrushing alone is effective in reducing bacterial counts in the mouth, but not dramatically. Tongue cleaning seems to have a more dramatic effect on the salivary levels of caries-causing bacteria, Such as mutans streptococci.⁵ With tongue scraping becoming established as an excellent tool for reducing the levels of mutans streptococci in the oral cavity, it would be of great interest to compare the efficacy to tongue brushing method for decreasing the bacterial count in the oral cavity.

In this regard the effect of mechanical oral hygiene techniques on the levels of microorganisms, especially mutans streptococci, is of great interest to dentists focused preventive care.

OBJECTIVES OF THE STUDY

1. To assess the effect of tongue scraping and tongue brushing on oral mutans streptococci level.
2. To compare the two methods of tongue cleaning on the reduction of oral mutans streptococci level.

MATERIALS AND METHODS

Study Design

Double-blinded randomized controlled trial.

Study Population

Twenty healthy subjects with similar food habits aged 14 to 15 years were selected and randomly distributed into two groups:

Group A—10 subjects, group B—10 subjects.

Following tongue cleaning devices had been selected.

- Flat plastic tongue scraper—group A subjects.
- Nylon multitufted small headed toothbrush—group B subjects.

Inclusion Criteria

- Subjects with permanent dentition were included.
- All levels of oral hygiene and dental caries were accepted those who had either rampant tooth decay or very poor oral hygiene were also included in this study this was important to see if the protocol was effective for all ranges of oral hygiene or not.

Exclusion Criteria

- Subjects suffering from tonsillitis
- Subjects with any contributing medical history
- Subjects who have performed any type of tongue cleaning habits.

Method of Collection of Salivary Samples

Unstimulated salivary samples were collected in the test tube by spitting method from all subjects prior to start of the experiment to establish base line mutans streptococci level, after routine toothbrushing.

Demonstration to perform tongue scraping and tongue brushing was given to both the groups by a single examiner. Subjects were told to clean the tongue every morning after routine toothbrushing for 7 days.

Group A, involving 10 subjects, were given a tongue scraper and asked to scrape the dorsum of the tongue along the linea mediana and at each lateral part of the tongue once every morning after routine toothbrushing, every day for 7 days. Group B, consisted of 10 subjects were asked to brush the tongue with forward and backward strokes along the linea mediana and at each lateral borders of the tongue once every morning after routine toothbrushing, every day for 7 days.

Upon scraping or brushing the tongue, the patients were asked to spit out the excess saliva that had accumulated on the tongue. Then unstimulated salivary samples were obtained at 1 hour, 3rd and 7th day after the start of the experiment. A total of 4 samples were collected from each individual. During the entire study participants continued their habitual oral hygiene and were instructed not to take any antibiotics without prior information.

One milliliter of salivary samples were collected in the test tube and transported through thyroglycolate broth media. 10 micro-liters of saliva from each sample was inoculated on mitis salivary agar plate and incubation was done at 37°C in 5 to 10% carbon dioxide for 48 hours. Sorbital broth was used for identification of mutans streptococci group.

Ethical Clearance and Informed Consent

Before starting the study, ethical clearance was obtained from Ethical Review Committee Board of KLE's Institute of Dental Science, Belgaum, Karnataka India. Oral consent was obtained from all the children and written informed consent was obtained from the parents.

Statistical Analysis

Statistical test employed for the obtained data in our study were Paired and unpaired 't' tests. There were 20 participants

in this research study. Paired 't' test was used to compare within the group at different intervals and unpaired 't' test was used to compare between the two groups.

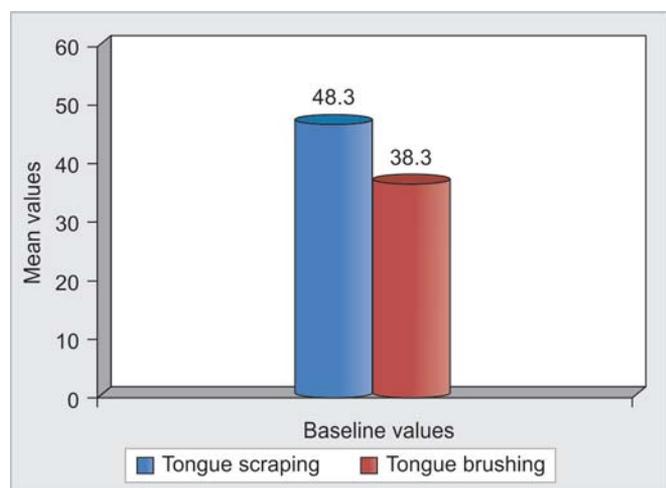
RESULTS

Reduction in the mutans streptococci level from 48.4×10^4 colony forming units (CFU) and 38.3×10^4 CFU at baseline in tongue scraping and tongue brushing group respectively to 0.34×10^4 and 0.39×10^4 CFU after 7th day ($p < 0.01$).

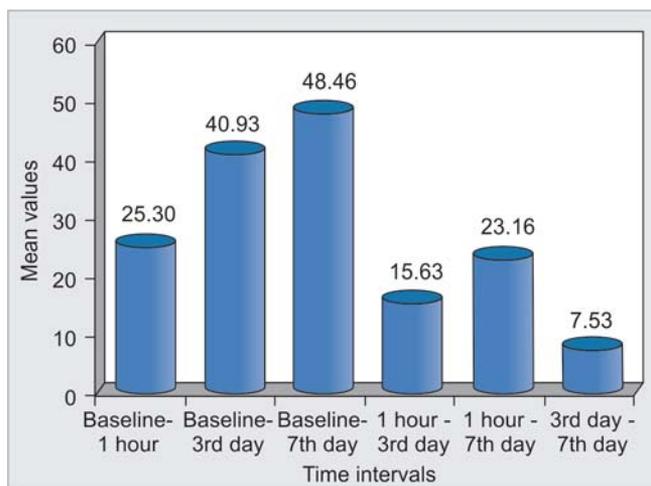
Graph 1 show the comparisons of mean number of mutans streptococci in tongue scraping and tongue brushing groups at baseline. Mean number of mutans streptococci in tongue scraping group was 48.8×10^4 and in tongue brushing group it was 38.3×10^4 colonies forming units. The results demonstrate that there were no significant differences between group means at base line. This simply states that the groups were statistically equivalent before the start of the treatment. Base line measurements were compared to ascertain, if there were any differences among the groups before the start of the treatment.

Graph 2 shows the mean decrease in mutans streptococci level in tongue scraping group at different time intervals. When baseline value was compared with 1 hour, 3rd day and 7th day value ($p < 0.01$) and 1 hour value with 7th day value statistically highly significant difference was found. But when 1 hour value was compared with 3rd day value and 3rd day value with 7th day value no significant difference was found.

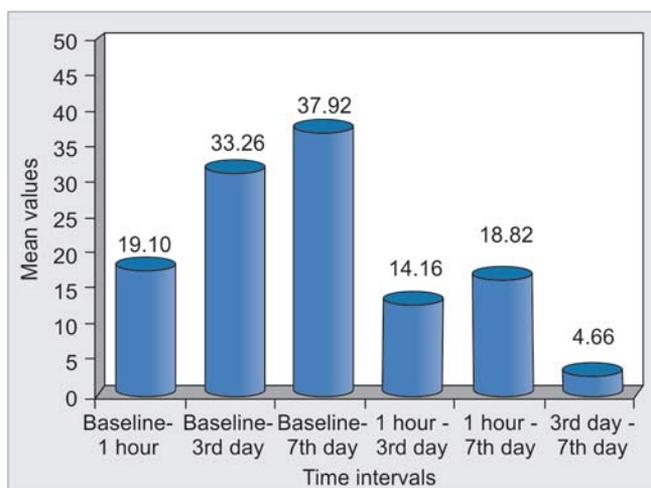
Graph 3 shows the mean decrease in mutans streptococci level in tongue brushing group at different time intervals. When baseline value was compared with 1 hour, 3rd day and 7th day value ($p < 0.01$) and 1 hour value with 3rd day and 7th day value statistically highly significant difference



Graph 1: Comparison of mean number of mutans streptococci in tongue scraping and tongue brushing groups at baseline (all values in 10^4 CFU)



Graph 2: Comparison of mean decrease in mutans streptococci level in tongue scraping group at different time intervals (all values in 10^4 CFU)



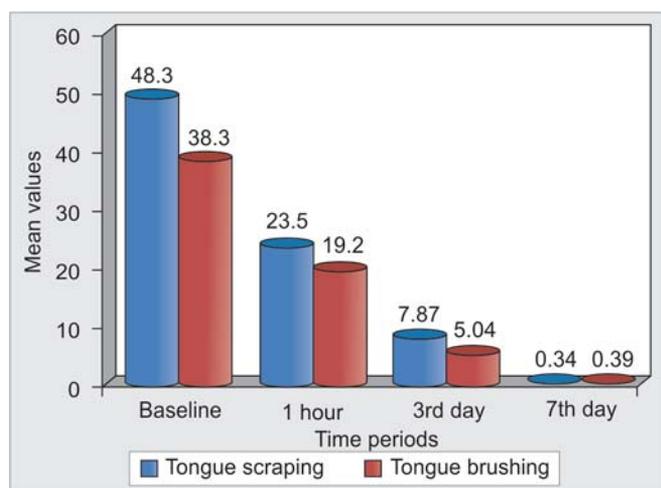
Graph 3: Comparison of mean decrease in mutans streptococci level in tongue brushing group at different time intervals (all values in 10^4 CFU)

was found. Only when 3rd day value was compared with 7th day value no significant difference was found.

Graph 4 shows the gradual reduction of microorganisms from baseline to one hour, 3rd day and 7th day ($p < 0.01$) but when it was compared between the groups at the final stage (after 7th day) no significant difference was found.

DISCUSSION

The data obtained from this research project showed very clear trends and highly significant results. In the present study, there was a gradual reduction in the mutans streptococci count from base line to 7th day after tongue scraping which is in close agreement with the study conducted by Almas et al,² White GE et al⁵ and Bordas A et al.⁷ Since, this method is performed every day there will be a gradual reduction of microorganisms from the tongue coating. Hence, by 7th day the count reduced significantly.



Graph 4: Comparison of mean number of mutans streptococci in tongue scraping and tongue brushing groups at different time periods (all values in 10^4 CFU)

Bordas A et al⁷ reported that while mechanical tongue cleaning with or without chemical intervention can reduce bacterial load on the tongue, this effect is transient, and regular tongue cleaning is required to provide a long lasting (overnight) reduction in bacterial numbers. Nevertheless, tongue cleaning is an oral hygiene procedure that is little practiced due to discomfort and/or lack of awareness on the part of dental professionals and their patients.

In a study conducted by Quirynen M et al⁶ no significant reduction in bacterial load was found when using toothbrush or scraper to clean the tongue. This may be because of different methods employed in collection of microbial sample from the tongue and analysis of nonspecific bacteria, where as in the present study, only mutans streptococci level has been evaluated and saliva samples were collected by spitting method.

Hence, this study is unique, being the first to compare two different methods of tongue cleaning and evaluating its effects on the reduction of specific microorganisms. Thus, the clinical significance of this study should not be overlooked as research has proved the need to include the tongue in all oral hygiene measures. Thorough preventive measures need to include an effective means of reducing the pool of mutans streptococci inhabiting the dorsum of the tongue if one is to truly expect a striking reduction in caries.

CONCLUSION

Both tongue coating removal methods evaluated were efficient in reducing mutans streptococci level. This implies that physical removal of the coating on the dorsum of the tongue is important and not the method used for the same. On the basis of literature there appears to be enough data to justify the necessity to clean the tongue on a regular basis and as part of daily home oral hygiene practice.

Tongue cleaning is simple, fast and the benefits for most people far out weigh the small investment and time required to accomplishing this procedure. Therefore, oral hygiene measures should include the dorsum of the tongue, especially in high-risk patients, who have endogenously high levels of mutans streptococci residing in the oral cavity.

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