



Study of Caries Prevalence among Miswak and Non-Miswak Users: A Prospective Study

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ABSTRACT

Introduction: Various types of oral hygiene measures have been practiced by different populations around the world, as there is difference in the oral hygiene products including toothpicks and toothpowders. Miswak or tooth cleaning stick, for mechanical tooth cleaning, can be traced back at least to pre-Islamic times. Currently, many of the world populations still use chewing sticks as the single method for tooth brushing. The present study was done to study the incidence and prevalence of caries among Miswak and non-Miswak users.

Materials and methods: The study was done consisting of 120 cases and 120 control group (60 boys and 60 girls in each group) from the secondary school. The materials used were light, explorer, mirror, gloves, upper and lower teeth models, Miswak, and common toothbrush.

After the recording of the primary data, Miswak was given to case group and the students were trained to use it on the teeth models.

After 2 years, the examination of the teeth was done using the same method as before start of the study and by the same investigators. All the data were recorded, tabulated, and analyzed with the help of Statistical Package for the Social Sciences (SPSS) statistics version 17 using Student's t-test.

Results: From the 240 participants, only 211 had continued the study for the total period of time. Out of these, 111 were from the study group and 100 from the control group. On comparison of the decayed-missing-filled (DMF) index scores of the study and control groups, before and after completion of the study, had also shown that the caries index was increased and the difference was found to be statistically significant.

Conclusion: From the study, it can be concluded that the study group using Miswak had less number of caries incidence than the control group of non-Miswak.

Clinical significance: Miswak can be used as teeth cleaning aid in day-to-day life as it can reduce the caries incidence.

Keywords: Caries prevalence, Miswak, Non-Miswak, Tooth-brushing.

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INTRODUCTION

It is always said that a healthy mouth often leads to a healthy body. Systemic health is always preceded by a good oral health.¹ The self-consideration of the oral health, by teeth cleaning with the help of toothbrush, or with the use of biting sticks, prevents formation of the dental plaque and periodontal infection.^{2,3}

The various methods used for the oral hygiene maintenance can be chemical or mechanical. Dentifrices and toothbrushes are widely used for cleaning teeth. The traditional use of chewing sticks for cleaning teeth is deeply rooted in the Islamic culture.^{4,5}

For the use of chewing sticks, the sticks of various plants of approximately pencil size are taken and chewed on one end until it becomes frayed into a brush. This brush end is used for the teeth cleaning in a similar manner as that of use of a toothbrush. This method of brushing teeth with the help of sticks is called as chewing sticks or Miswak.⁴

Miswak (miswaak, Miswaki, miswak, meswak, sewak, mswaki, siwaki and siwak are the different synonyms used in various Arabic dialects and countries) is an Arabic word, which means a tooth cleaning stick. In English language, Miswak has been referred to as the "natural toothbrush." In certain geographical regions

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where the Arak (synonymous with Arak) tree grows, Miswak is often interpreted as tooth sticks made up from the Arak tree. The Arak trees botanical name is *Salvadora persica* L (family: *Salvadoraceae*).^{6,7}

This is an evergreen small upright shrub or tree with aromatic roots and white branches, often more than 30 cm in diameter and 3 m in height. It is also called as "toothbrush tree" in English, or also called as the "Persian toothbrush tree" or the "toothbrush tree of the Orient."⁶

Sushruta Samhita and Charaka Samhita, the medical books of ancient India, also stressed on brushing the teeth with the use of herbal sticks and maintenance of the oral hygiene.⁸

The present study was done to study the incidence and prevalence of caries among Miswak and non-Miswak users.

MATERIALS AND METHODS

The study was done consisting of 120 cases and 120 control group (60 boys and 60 girls in each group) from the secondary school (AlKharj region). The study was approved from the ethical approval committee, college of dentistry, Prince Sattam bin AbdulAziz University, AlKharj, Saudi Arabia. The materials used were light, explorer, mirror, gloves, upper and lower teeth models, Miswak, and common toothbrush.

The study was done with the help of decayed-missing-filled (DMF) index for the assessment of the presence of carious teeth. All the students' teeth were examined at the beginning of the study for the DMF scores present. A standard criterion was used for the examination of the teeth.

After the recording of the primary data, Miswak was given to case group and the students were trained to use it on the teeth models. The students were told to use them two times daily. The control group was given toothbrushes and also told the method of brushing on the teeth models same as case group. They were also told to brush two times daily similar to the case group. All the students were kept under observation and meetings were arranged every 3 months for the reminder of the instructions. The parents of students were also told to observe their child for the method of brushing.

INCLUSION CRITERIA

- Students willing to participate in the study.
- Students who were used of the told method of brushing were only considered for the study.
- Students whose parents were ready for their child to participate in the study.

EXCLUSION CRITERIA

- Students not used the said method of brushing.
- Students not willing to participate in the study.
- Students having extensive multiple carious lesions.
- Students having any other systemic disease.

After 2 years, the examination of the teeth was done using the same method as before start of the study and by the same investigators. All the data were recorded, tabulated, and analyzed with the help of Statistical Package for the Social Sciences (SPSS) statistics version 17 using Student's t-test.

RESULTS

From the 240 participants, only 211 had continued the study for the total period of time. Out of these, 111 were from the study group and 100 from the control group. This means that 9 students from the study group and 20 students from the control had not completed the brushing schedule till the end of the study. This difference is significant ($p = 0.011$, $p < 0.05$) and it shows that Miswak using students had more interest in brushing their teeth than the control group (Table 1).

The training given and the number of brushing teeth per day were similar for the two groups. The similar number of boys and girls were selected at the start of the study, but out of 120 boys, 104 continued the study and 107 girls continued the study. This shows that more number of boys discontinued the brushing study than the girls. But the difference is not significant ($p = 0.073$, $p > 0.05$).

The number of brushing their teeth (two times daily) was similar at the start of the study and the DMF scores also were nearly the same at the start of the study between the study and control groups and the difference was not statistically significant (Table 2, Graph 1, Student's t-test, $p > 0.05$).

The comparison of the DMF scores after completion of the study had shown that there is more number of teeth affected with caries in the control group than that of in the Miswak using group and the difference was found to be statistically significant (Table 3, Graph 2, Student's t-test, $p < 0.05$).

On comparison of the DMF scores of the study before and after completion of the study had also shown that the caries index was increased and the difference was found to be statistically significant (Table 4, Graph 3, Student's t-test, $p < 0.05$).

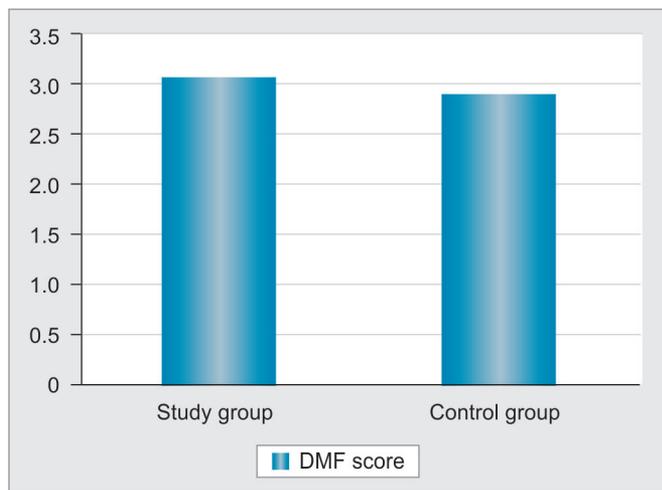
Also, the comparison of the DMF scores of the control group before and after the study had shown that extremely significant increase of the DMF scores (Table 5, Graph 4, Student's t-test, $p < 0.01$).

Table 1: Number of participants of the study group and control group including males and females

Group	Number of participants (n)	Males	Females
Study group	111	53	58
Control group	100	51	49
Total	211	104	107

Table 2: Comparison of the scores of the DMF index of the study and control group before start of the study

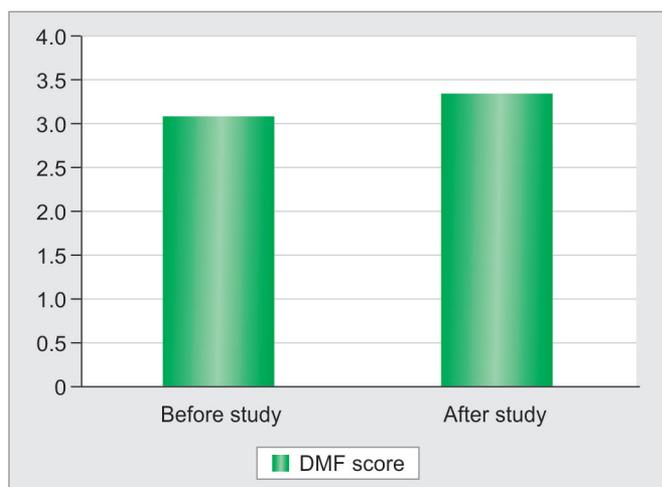
Group	Number of participants (n)	Mean DMF score (SD)	t-value	p-value
Study	111	3.07 (0.87)	1.4853	>0.05
Control	100	2.89 (0.91)		



Graph 1: Comparison of the scores of the DMF index of the study and control group before start of the study

Table 4: Comparison of the scores of the DMF index of the study group before and after study

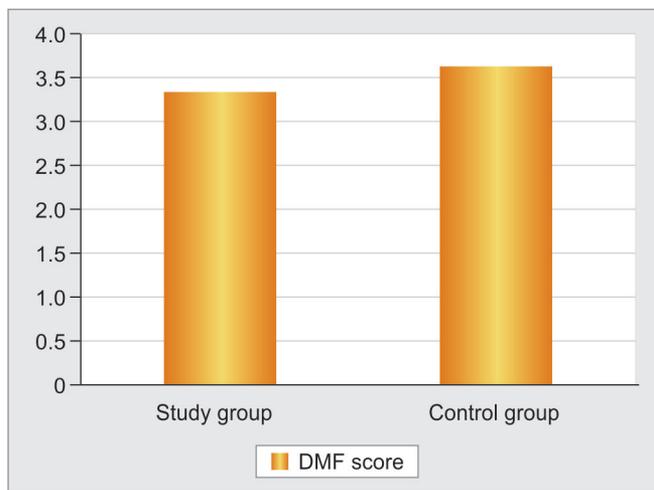
Group	Number of participants (n)	Mean DMF score (SD)	t-value	p-value
Before study	111	3.07 (0.87)	2.3619	<0.05
After study	111	3.35 (0.89)		



Graph 3: Comparison of the scores of the DMF index of the study group before and after study

Table 3: Comparison of the scores of the DMF index of the study and control group after completion of the study

Group	Number of participants (n)	Mean DMF score (SD)	t-value	p-value
Study	111	3.35 (0.89)	2.2803	<0.05
Control	100	3.63 (0.93)		



Graph 2: Comparison of the scores of the DMF index of the study and control group after completion of the study

Table 5: Comparison of the scores of the DMF index of the control group before and after study

Group	Number of participants (n)	Mean DMF score (SD)	t-value	p-value
Before study	100	2.89 (0.91)	5.8266	<0.01
After study	100	3.63 (0.93)		



Graph 4: Comparison of the scores of the DMF index of the control group before and after study

DISCUSSION

The vital role in the getting of the optimal oral and periodontal health is often based on the oral self-care entailing regular and thorough food deposits and dental plaque removal from the teeth as well as from the gingiva.⁹

Although the improvement of daily dental and oral health has been seen nowadays in the world, the incidence of the dental caries and periodontal diseases is still

increasing, as there is wide use of sugar in food and also due to fluoride and calcium deficiency.^{10,11}

The maintenance of oral health is also an important factor for the prevention of the dental caries and periodontal diseases. The habit of oral self-care with the help of cleaning agents, such as toothpaste and toothbrush or various chewing sticks varies from country to country, culture to culture, and urban to rural areas.^{9,12}

There are seven different types of plants that can be used as chewing sticks, but the most widely used is the *Salvadora persica* plant.¹³ The medicinal values of chewing sticks are because of their ingredients and cleaning mechanisms. These sticks were also recommended as efficient tool for maintenance of oral health by the World Health Organization (WHO).¹¹ The chewing sticks are effective in evacuating the dental plaque as there is joint effect of antimicrobial activity, mechanical cleaning, and upgraded salivation.^{2,14}

In the present study, it was found that the caries incidence was higher in the non-Miswak group as compared to Miswak using group. This shows that Miswak has some anticariogenic properties that inhibit the plaque formation, and ultimately caries formation.¹¹

Miswak is made up of a pencil-sized stick of 15 to 20 cm long with a diameter of 1 to 1.5 cm from the Arak tree or also called as toothbrush tree. But in some areas it is also made from the lime (*Citrus aurantifolia*), orange (*Citrus sinensis*), or neem (*Azadirachta indica*). The pleasant hot taste of chewing sticks made them easily chewable.¹¹

The importance of Miswak or chewing sticks has been investigated in various studies. The study done by Almas et al¹⁵ had showed that Miswak has certain antimicrobial effects on *Streptococcus mutans* and *faecalis*. Also, the study by Al-Lafi and Ababneh¹⁶ and Almas et al¹⁷ showed *Streptococcus faecalis* as the most sensitive microorganism affected by Miswak.¹¹

Also previous studies had shown the anticariogenic effect of Miswak. In an oral health survey conducted in Sudan, Emslie had reported a lower caries prevalence among Miswak users than that of toothbrush user.⁷

Also studies by Baghdady and Ghose found similar results of lower caries incidences in school children using Miswak. The study by Olsson reported that use of chewing sticks decreased dental caries incidence more efficiently than the conventional toothbrushes.⁷

The chewing effects and pungent taste of Miswak can also improve saliva secretion in the mouth and thus improving its buffering capacity. In a study by Sofrata et al, it was found that the parotid gland saliva secretion was increased by rinsing with Miswak extract and thus increases the plaque pH. This effect is beneficial for the decreasing the activity of the cariogenic bacteria.⁷

It was also found that the Miswak sticks remove the dental plaque from the interproximal areas to the same extent as from the other sites of the tooth.¹

CONCLUSION

Present study showed that Miswak effectively prevented dental caries in high school students. Future studies containing large number of people and conducting some studies on antimicrobial and silicate effects of Miswak are suggested.

AUTHORS' CONTRIBUTION

Mohammed Mustafa: Data collection, study design, manuscript drafting, final manuscript approval. Zaid AlJeaidi: Study design, review and editing of the manuscript. Wafa Hassan AlAajam, Kawthar Ahmed Dafaalla Mohammed: Data analysis, manuscript writing, manuscript approval.

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