Original Research Article

Comparison of tooth brushing with traditional miswak in maintenance of oral hygiene

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Abstract

Background: Chewing sticks were used throughout the ancient times many communities till date. Many people in today's modern days still have maintained this practice of oral hygiene due to reasons like cost, customs and religious reasons and accessibility. The miswak, obtained from the twigs of the *Salvadora persica* tree, may be beneficial due to its mechanical cleaning. The aim of the present study was to compare the oral hygiene status and gingival conditions following the use of conventional tooth brushing and miswak over a period 100 days.

Materials and methods: The study was conducted in a madrasa in outskirts of Jammu and Kashmir. Out of the total 154 subjects, a total of 148 subjects who were voluntarily willing to participate in the study were selected. Out of these subjects 72 subjects were using miswak (Group I), 76 subjects were using tooth brush and tooth paste (Group II) as an oral hygiene aid. All of these subjects were evaluated for Gingival and Plaque status on 50^{th} and 100^{th} day following oral prophylaxis.

Results: Both Group I showed a significant difference ($p \leq 0.05$), at 50^{th} and 100^{th} day in their mean plaque scores. The mean gingival scores recorded for subjects using only miswak and those subjects using both miswak as well as tooth brush and tooth paste increased from 50^{th} day to 100^{th} day and showed a statistical difference between the two means in group I.

Conclusion: The results of the present study suggest that miswak can be used as an effective adjunct for oral hygiene maintenance along with toothbrush and tooth paste as it is readily available and inexpensive.

Key words

Oral Hygiene, Miswak, Toothbrush and toothpaste.

Introduction

Oral hygiene has been practiced by all populations and cultures around the world since antiquity. Oral hygiene maintenance through regular removal of dental plaque and food debris is an essential factor in prevention of dental disease. Oral hygiene practices may vary from region to region and are affected by the local cultures beliefs. Natural methods of tooth cleaning using chewing sticks prepared from the twigs, stem or roots from a variety of plant species and oil pulling have been practiced for years in many communities. Chewing sticks were have been used throughout the Greek and Roman empires and have been used by Jews, Egyptians, and Muslims. Today they are used in Africa, Asia, the Eastern Mediterranean region, and South America [1].

Miswak as an oral hygiene aid is widespread among eastern population due to religious norms. The World Health Organization has recommended and encouraged the use of these sticks in areas where their use has been established by the custom or other beliefs [2]. The use of miswak is an old custom, which was adhered to by ancient Arabs to clean their teeth [3]. The miswak conventionally meaning a "stick" used to clean teeth, is obtained from the twigs of the *Salvadora persica* tree, also known as *Arak tree* or the *Peelu tree* [4]. The miswak may be beneficial due to its mechanical cleaning efficacy due to its fibers and due to some chemical action because of its constituents. The release of these beneficial chemicals as chlorides, silica, sulphur, fluorides, saponins and sterols all play an important role in oral hygiene maintenance [5]. Their taste is agreeable and not unpleasant and reported to have antiplaque and many other pharmacological properties.

The present study was done to compare the efficiency of miswak with conventional tooth brushing with tooth paste as an oral hygiene aid among children in a madrasa, within Jammu and Kashmir State, India, with the objective to assess the oral hygiene status and gingival conditions in the selected subjects over a period 100 days.

Materials and methods

Study design

The present study was done among a varied population living in a similar environment. Efficacy of different oral hygiene aids was assessed depending upon the ability of each method in maintaining the plaque status and gingival status of the selected subjects. A single madrasa in the rural area of Jammu and Kashmir state was selected based on the maximum number of the subjects present in it. A total of 154, male students were staying in the madrasa were included. A written permission was acquired from chief cleric and was educated about the study. All the subjects who were present in the selected madrasa from June 2018 to September 2018 were included in the study. Oral prophylaxis of the subjects was done, the study was conducted for a period of next 100 days. Every subject was evaluated on 50^{th} and 100^{th} day after the completion of scaling and polishing. Selected study population was within the age group of 12-16 years. Out of the total 154 subjects, a total of 148 subjects, were voluntarily willing to participate in the study. Out of these subjects 72 subjects were using miswak (Group I), 76 subjects were using tooth brush and tooth paste (Group II). All of these subjects were permanently residing in the madrasa area. Excluded subjects included the subjects under medication for any systemic diseases, tobacco users, subjects under orthodontic treatment or complex periodontal therapy, subjects receiving antibiotic therapy, physically disabled subjects and subjects with mixed dentition were also excluded from the study.

A pre-designed proforma, enquiring about the age of the subjects and the method of cleaning

the teeth was used. The collection of data for oral hygiene assessment was done using Gingival Index (Loe H and Silness J, 1963) [6] and Plaque Index (Silness J and Loe H, 1964) [7]. Examination of the subjects was done on 50th day after the start of the study followed by 100th day as final examination. Examination was carried out in natural light. Examination at both the intervals was carries out by the same investigators on same subjects in order to decrease the variability in results. Examination was carried out with recommended sets of sterilized instruments.

The recordings were compiled and data were entered into an Excel Sheet database (MS Office Excel 2000; Microsoft Corporation, Redmond, WA, USA). The Data was analyzed using Minitab 16.1.1 version of statistical software. The significance of differences within the groups (over the course of the study) was sought using The Mean, Standard Deviation, One way ANOVA test and Scheffe test were performed to reveal the statistical significance. The confidence level of the study was proposed to be 95%; hence a *P* value <0.05 had been considered significant, *P* value <0.01 had been considered highly significant and a *P* value <0.001 had been considered very highly significant.

Results

A total of 148 male subjects were included in the study. The results were calculated for the two groups. In the present study Group I comprised of 58.6% subjects, Group II included 41.4 % subjects.

Table - 1 shows the mean gingival index score for group I and group II at 50th day and 100th day after the start of the study. The mean gingival scores recorded for subjects using only miswak increased from 50th day to 100th day and showed a statistical difference between the two means. Group II that was the subjects who were using toothbrush and tooth paste did not show any significant difference in the mean gingival scores when compared between 50th and 100th day as shown by the Students *t* test ($p \leq 0.05$).

Table - 1: Mean Gingival Index score among the study subjects.

Study Groups	Mean ± SD 50th day	Mean ± SD 100th day	P
Group I (Only miswak)	1.42 ± 0.46	1.63± 0.24	T-Value = -124.31 P-Value = 0.046*
Group II (Toothpaste/ tooth brush users)	1.51 ± 0.32	1.54± 0.61	T-Value = -132.89 P-Value = 0. 066
Paired t test, *Significant at 5% level			

Table - 2: Mean Plaque Index score among study subjects.

Study Groups	Mean ± SD 50th day	Mean ± SD 100th day	P
Group I (Only miswak users)	1.18 ± 0.11	1.24 ± 0.32	T-Value = -112.22 P-Value = 0.065
Group II (Toothpaste/ tooth brush users)	1.21 ± 0.14	1.42 ± 0.14	T-Value = -128.56 P-Value = 0. 048*
(* = $p \leq 0.05$ using Scheffe Test).			

Table - 2 shows the mean plaque index score for group I and group II at 50th and 100th day. Highest mean plaque scores were seen in Group I, subjects using only miswak did not show any significant difference in the mean values. However, the mean plaque score difference at 50th and 100th day in group II were statistically significant ($p \leq 0.05$), While there was no significant difference between the mean plaque scores of Group I and Group II, that was the

subjects who were using toothbrush and tooth paste had a similar plaque accumulation as compared to those using miswak.

Discussion

The present descriptive study was performed in a homogenous population living in a madrasa in outskirts of Jammu and Kashmir State, India. The selected population had similar diet pattern and the water source was common to all of these subjects. Out of the total population of 154 children, 148 subjects who were in the age range of 12-16 years were included. Final results were prepared for the 148 subjects who voluntarily participated in the study.

The present study results show that the subjects who were using miswak as well as toothbrush and toothpaste were having better oral hygiene and had a lower plaque and gingival scores. All the methods used for the maintenance of oral health are mainly either mechanical or chemical. Toothbrushes with toothpastes are the most widely used method of oral hygiene maintenance [8]. Though various cultures have many other methods of oral hygiene maintenance, chewing stick (Miswak) is an old culture in Arabic nations [3]. Sticks of various plants are chewed their flared end cleans the teeth in a similar manner to the use of a conventional toothbrush. In Middle East the most common source of chewing sticks or miswak is Arak *(Salvadora persica)* obtained from its roots, branches and bark [9]. Miswak is used fewer than five times a day or used as a conventional toothbrush once usually at morning [10].

Many studies have examined its effect on gingival and periodontal health and the results were found to be contradictory [11]. The present study was done to assess the efficacy of miswak with that of conventional tooth brushing with tooth paste. The results of the present study demonstrated that oral hygiene status of the students using both toothbrush with toothpaste and miswak was significantly similar. This finding is in accordance with some previous studies [2, 12]. In another study, it was reported that when powdered form of Miswak is used with a toothbrush it will give better results than sticks alone in terms of plaque removal [13]. Mechanical action of fibers of miswak may have beneficial properties and due to its pharmacological actions, it yields better plaque removal efficacy. The release of various chemicals like chlorides, silica, saponins, sulphur, vitamin C and sterols may also play an important role in decreasing the plaque accumulation [13]. It has been reported elsewhere that sulfur compounds which are present in Miswak smell have antimicrobial effect [14]. As reported earlier, fluoride is present in *Salvadora in a reasonable* amount [15]. Miswak's content of silica also adds to the mechanical plaque removal. Certain plant fibres such as miswak contain sodium bicarbonate which has mild abrasive properties as well as germicidal effect [16].

In the present study, the mean plaque score difference between the subjects using only miswak and toothbrush with tooth paste groups was not statistically significant. In previous studies, similar reports of no significant differences in plaque scores between the Miswak and toothbrush users have been reported [4]. While there are many studies which have reported a better cleaning efficacy of Miswak when compared to tooth brushing [2, 12]. The results of these studies were in agreement with the present study. While comparing the mean plaque of group I and II at 100^{th} day a higher mean plaque score was observed in the miswak group which was similar to a previous study done in other studies which revealed higher plaque and gingival bleeding in chewing stick users [17]. When comparing the mean plaque score of the miswak group at 50^{th} and 100^{th} day the mean plaque scores showed increase than the tooth brush users at the same interval of 100 days. This could be attributed to the cumulative effect of plaque with time and this could also demonstrate that with longer period of using miswak it might not able to remove plaque efficiently as compared to a toothbrush. In a

previous study it was observed that after cleaning teeth for 5 min using chewing sticks was as effective in controlling and removing dental plaque as toothbrush and paste which is in accordance with the present study [18]. However a previous study while finding a contrary result concluded that miswak could be used in maintenance of oral hygiene due to its economical and readily availability [5]. The results also showed that there was no significant change in the gingival index in group I and group II when comparing the 50^{th} day reading to 100^{th} day gingival scores. The possible reason for this can be the mechanical effect of tooth brush and the chemical effect of the miswak. These findings are similar to the previous studies [19]. It has been reported in previous studies a positive relationship exists between gingival recession and the use of miswak as compared to the conventional toothbrushes [17]. Furthermore, there can be certain limitations which can be attributed to the study, as all the study subjects were males, gender bias could not be ruled out. Study subjects could also have done a better oral hygiene maintenance during the study period in order to please the examiners due to Hawthrone Effect. While observation during the present study, an important factor was seen that the miswak users tend to clean or use the miswak stick for a longer duration than the conventional tooth brush users which could affect the outcome of the study.

Conclusions

The results from the present study denote that miswak can be recommended as an effective tool for oral hygiene maintenance as it is readily available and inexpensive. However, further studies are warranted on modern scientific grounds.

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