

Efficiency of traditional chewing stick (miswak) as an oral hygiene aid among Muslim school children in Lucknow: A cross-sectional study

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ABSTRACT

Background: Oral hygiene practices vary from country to country and from culture to culture. 'Miswak' as an oral hygiene aid is a pre-Islamic custom contributed to ritual purity. The beneficial effects of miswak in respect to oral hygiene and dental health are attributed to its mechanical and pharmacological actions.

Aim: The aim of the present study was to assess and compare the oral hygiene status and gingival conditions in Muslim school children of Lucknow city.

Materials & method: Study population comprised of 297 individuals in age group of 12–15 years from residential and non-residential Islamic institutions in Lucknow city. Oral hygiene status was assessed using the Gingival Index (1963), Oral Hygiene Index-Simplified (1964) and Plaque Index (1964).

Results: Statistically significant difference of mean gingival index score was observed among miswak and toothbrush & toothpaste users. Miswak users had lower mean gingival index score. Mean plaque score was lowest among combined users of toothbrush and miswak.

Conclusion: Miswak users exhibited a better mean gingival score as compared to toothbrush & toothpaste users, while the mean plaque score was lowest among the combined users of toothbrush and miswak.

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Keywords: Oral hygiene, Miswak, Toothbrush & toothpaste

INTRODUCTION

Oral hygiene maintenance through regular removal of dental plaque and food deposits is an essential factor in prevention of dental caries and periodontal disease.¹ Despite the widespread use of toothbrushes and toothpastes, natural methods of tooth cleaning using chewing sticks prepared from the twigs, stem or roots from a variety of plant species have been practiced for years in many Middle Eastern, African and Asian communities. These communities still do not use conventional (modern) toothbrushes due to reasons like cost, availability, customs and religious reasons.² Miswak is an oral hygiene aid with widespread use among Muslim

population due to religious norms. The use of miswak is a pre-Islamic custom, contributed to ritual purity. It is used five times in a day before every Namaz (prayer) as a religious practice.¹ Miswak is made from the twigs of the *Salvadora persica* tree, also known as *Arak tree* or *Peelu tree*. The conventional meaning of miswak is "stick" used on teeth and gums to clean them. Its various names are 'miswak' and 'Siwak' as used in the Middle East, 'Mswaki' in Tanzania, 'Mefaka' in Ethiopia and 'Datun' in India and Pakistan. Miswak is a more general term which includes all types of sticks used as tooth-cleaning aids.² The beneficial effects of miswak in respect of oral hygiene and dental health are partly due to its mechanical cleaning efficacy including

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mechanical effects of its fibers and partly due to its pharmacological actions.³ The release of beneficial chemicals like chlorides, fluorides, silica, sulfur, vitamin C, saponins and sterols may all play an important role.⁴ Hence the aim of the present study was to assess and compare the oral hygiene status and gingival conditions in Muslim school children of Lucknow city using miswak, toothbrush and toothpaste or combination of both for their routine oral hygiene practices.

MATERIALS & METHOD

Study design

A descriptive cross-sectional study was done to evaluate efficacy of different oral hygiene aids measured as per their oral hygiene status, plaque status and gingival status.

Source of data

Before the start of the study, a list of 28 non-residential Islamic institutions and 18 residential institutions registered in Lucknow with Govt. of Uttar Pradesh were obtained. From them 10% institutions were randomly selected (i.e. three non-residential schools and two residential institutions).

Study population

Study population consisted of total 297 individuals (151 individuals from residential and 146 from non-residential institutions) in age group of 12–15 years. Only male volunteers were included in the study due to very less availability of female respondents.

Ethical clearance

The proposed study was reviewed by the Institutional Ethical Committee of Sardar Patel Postgraduate Institute of Dental & Medical Sciences, Lucknow and clearance was obtained. A written consent was obtained from the respective school authorities before the commencement of this survey.

Inclusion criteria

All the subjects present on the day of the survey were included.

Exclusion criteria

Subjects under medication for any systemic diseases, smokers/long-term tobacco chewers, those undergoing

orthodontic treatment or those who had received complex periodontal therapy within past 6 months and students having any disability were excluded from the study. Subjects having mixed dentition were excluded to rule out gingival inflammation associated with eruption & shedding sequence.

Study duration

The study was conducted in between March–June 2011.

Method of obtaining data

A pre-designed & pre-tested proforma was used in the study. The study consisted of two parts; initially interviewing all individuals regarding their oral hygiene habits and practices followed by clinical examinations using – Oral Hygiene Index-Simplified (OHI-S 1964),⁵ Gingival Index (Loe & Silness 1963)⁶ and Plaque Index (Silness & Loe 1964).⁷ Interview and clinical examination were carried out by examiner herself with help of a trained recording clerk. Type III examination with recommended sets of sterilized diagnostic instruments was conducted. Study population were matched as much as possible regarding their frequency and duration of oral hygiene practices whether it was only miswak users or toothbrush/toothpaste users or both miswak & toothbrush combination users.

Intraexaminer reliability

The intraexaminer reliability was assessed by using weighted Kappa which was 0.88.

Statistical analysis

The data from the completed forms were entered into the Microsoft Excel – XP software programme. Data was analyzed using the SPSS-13 statistical software version. The Mean, Standard Deviation, One Way ANOVA test (for multiple group comparison) and Scheffe test were performed to reveal the statistical significance.

RESULTS

Table 1 shows the study population according to the oral hygiene habits. In both residential and non-residential institutions, 115 subjects were miswak users, 93 subjects were conventional toothbrush/toothpaste users and 79 were using both miswak & toothbrush. No participants were found using any traditional oral hygiene means

Table 1 Study participants according to oral hygiene habits.

Groups	Number of participants in residential schools	Number of participants in non-residential schools
Group I miswak users	68	57
Group II toothpaste/toothbrush users	44	49
Group III miswak & toothbrush users	39	40
Group IV other traditional oral hygiene aids	0	0

prevailing in this part of the world like salt, brick, charcoal etc. This might be because this study was conducted within the city limit only.

Table 2 depicts the mean OHI-S score for the miswak users (group I), the toothbrush/toothpaste users (group II) and the combined miswak/toothpaste–toothbrush users (group III) to be 2.1, 2.2 and 1.9 respectively. ANOVA test showed no statistically significant difference between groups regarding oral hygiene.

Table 3 depicts the mean plaque index score for three groups which were 1.13, 1.15 and 0.97 respectively. Findings suggested that mean plaque score was lowest among Group III i.e. combined users of toothbrush and miswak.

Table 4 shows the mean gingival index score for group I, group II and group III to be 1.43, 1.82 and 1.57. There was statistically significant difference of the mean gingival index score among Group I & II ($P = 0.001$).

DISCUSSION

Dental caries and periodontal diseases are the two main afflictions to mankind. Methods available for maintenance of oral health are mainly mechanical and chemical. Among mechanical methods, toothbrushes and dentifrices are widely used for cleaning teeth. The traditional toothbrush or chewing stick is deeply rooted in Islamic culture due to its religious and spiritual impact.² Pencil-sized sticks of various plants are chewed on one end until they become

Table 2 OHI-S score among study groups.

Study groups	Mean \pm SD	F	P
Group I (only miswak users)	2.1 \pm 0.16	2.39	0.104
Group II (toothpaste/toothbrush users)	2.2 \pm 0.14		
Group III (miswak & toothbrush users)	1.9 \pm 0.14		

Values in mean \pm SD.

Table 3 Mean gingival index score among study subjects.

Study groups	Mean \pm SD	P	Scheffe test
Group I (only miswak)	1.43 \pm 0.50	0.001	Gp I vs Gp II ^a
Group II (toothpaste/toothbrush users)	1.82 \pm 0.52		Gp I vs Gp III
Group III (miswak/toothbrush users)	1.57 \pm 0.57		Gp II vs Gp III

^a Significant at 5% level.

frayed into a brush. When used in this manner, they are commonly referred to as chewing sticks or miswak.³ Miswak is usually obtained from the roots of the Arak tree (*S. persica*), while some sticks are made from its branches and bark.⁸

Prophet Mohammed recommended miswak to be used to maintain proper oral hygiene, hence is considered by Muslims to be the first dental educator in oral hygiene. Orthodox Muslims practice miswak tooth cleaning five times daily as an important part of ablutions before worship. Others use miswak fewer than five times a day or use a conventional toothbrush instead.³

A recent Consensus Statement on Oral Hygiene concluded that chewing sticks may play a role in the promotion of oral hygiene; and that the evaluation of the effectiveness of chewing sticks requires further research.⁹ Despite its wide use, few studies have examined its effect on gingival and periodontal health. Hence the present study was taken up to assess the oral hygiene status and gingival conditions in Muslim school children. The age group of 12–15 years was selected from both types of institution to make the study population compatible & comparable. OHI-S has been considered to check the quality of individual oral hygiene maintenance of the study population whereas for gingival and plaque status, Gingival Index and Plaque Index have been studied.

The results of the present study demonstrated that oral hygiene status was better and mean plaque score was lowest in students using both toothbrush/toothpaste & miswak as compared to those using only toothbrush/toothpaste and only miswak. This finding may be attributed to

Table 4 Mean plaque index score among study subjects.

Study groups	Mean \pm SD	F	P
Group I (only miswak users)	1.13 \pm 0.13	2.42	0.103
Group II (toothpaste/toothbrush users)	1.15 \pm 0.11		
Group III (miswak & toothbrush users)	0.97 \pm 0.15		

the combined mechanical and chemical plaque controlling properties of toothbrushes and miswak. The beneficial effects of miswak in respect of oral hygiene and dental health are partly due to the mechanical action of its fibers and partly due to its pharmacological actions.² The release of various chemicals like chlorides, silica, sulfur, vitamin C, saponins and sterols may also play an important role. The sulfur compounds present in miswak as shown by their pungent taste and smell have a bactericidal effect.⁸ A study by Chawla HS reported that *S. persica* contains a reasonable amount of fluoride. Substantial amount of silica detected in *S. persica* ashes has been thought to contribute to miswak's mechanical action in plaque removal.¹⁰ Gazi et al indicate that plant fibers contain sodium bicarbonate. Apart from having a mild germicidal action, sodium bicarbonate has a mild abrasive property too.¹¹ The results of the study are in accordance with Olsson B and Norton & Addy.^{1,12} Cancro et al in a similar controlled study reported that powdered miswak if used with a mechanically proper device i.e. toothbrush, will give better results than miswak sticks alone in terms of plaque percentage.¹³

Results of the present study also inferred no significant difference in mean plaque score of individuals using only miswak or only toothbrush/toothpaste. Eid et al, Olsson B, Norton et al, and Norman et al reported similar results suggesting miswak efficacy to be comparable to conventional toothbrushes.^{1,4,12,14} Gazi et al demonstrated plaque scores to be significantly lower following the use of miswak in comparison to the conventional toothbrush used without toothpaste.¹¹ In a similar study by Danielsons et al, Kenyan school children using chewing sticks with or without toothpaste showed effective removal of dental plaque compared to children using only toothbrush and toothpaste.¹⁵ On the contrary, Asadi et al reported miswak using school children to have significantly more plaque at baseline than their matched toothbrush users.¹⁶

In the present study, there was statistically significant difference of the mean gingival index score among Group I (only miswak users) & Group II (Toothbrush/toothpaste users). Clerehugh et al similarly observed relatively low gingival index scores among 14 year old Ghana school children using different tooth-cleaning methods like chewing sticks, chewing sponge or toothbrushes.¹⁷

While chewing sticks may effectively remove dental plaque Eid et al found a positive relationship between gingival recession and the use of miswak as compared to the conventional toothbrushes.¹⁸ None of the study subjects in the present study reported gingival recession. This could probably be due to the younger age group spectrum chosen for the study.

CONCLUSION

On the basis of the results, observations and statistical analysis, the following conclusions could be drawn:

1. Oral hygiene status was the best in subjects using miswak together with toothbrush & toothpaste.
2. Mean plaque score was lowest among the combined users of toothbrush and miswak.
3. Miswak users showed a statistically significant better mean gingival score as compared to toothbrush & toothpaste users.

Hence, keeping in mind the Indian scenario, especially the rural population and the socio-economic status it can be suggested that miswak can be recommended as an effective tool for oral hygiene as it is inexpensive, readily available and does not need expertise or any extra resources to manufacture it. A traditional practice so common in a large percentage of our population should be further investigated on modern scientific lines of frequency and duration.

CONFLICTS OF INTEREST

All authors have none to declare.

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