

EFFECTIVENESS OF MISWAK AS COMPARED WITH TOOTHBRUSH: A CROSS-SECTIONAL STUDY

Hassam Anjum Mir, Mubashir Sharif*, Ali Asif**, Maleeha Shamim**, Maaz Qureshi**, Aqsa Akhtar**

Foundation University College of Dentistry, Rawalpindi Pakistan, *Combined Military Hospital Quetta/National University of Medical Sciences (NUMS) Pakistan, **Armed Forces Institute of Dentistry/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To determine if the traditional chewing stick, miswak, was as effective in cleaning teeth as toothbrush.

Study Design: Cross sectional study.

Place and Duration of Study: Armed Forces Institute of Dentistry, Rawalpindi, from Aug 2020 to Jan 2021.

Methodology: A total of 300 subjects were included which were divided in two groups on the basis of whether they used miswak or toothbrush as a cleaning aid. Group A was toothbrush user and group B was Miswak user. Plaque Index Score was used to determine the cleanliness of teeth. The scores were recorded and data analyzed using SPSS-23.

Results: The means and standard deviations of Plaque Index Score for group A and B were 0.96 ± 0.58 and 0.98 ± 0.56 respectively. The comparison of Plaque Index Score for both groups was insignificant with the *p*-value of 0.083.

Conclusion: Within the limitations of this study, it is concluded that, no significant difference was found between the effectiveness of traditional miswak and tooth brush. It is recommended that if the technique of teeth cleaning is good then any of the above-mentioned means of teeth cleaning can be used.

Keywords: Miswak, Oral hygiene, Plaque index, Toothbrush.

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INTRODUCTION

Good oral health has a positive effect on living standards of an individual. Maintenance of oral hygiene is of paramount importance in prevention of oral diseases. Dental plaque is responsible for the initiation and progression of oral disease.¹ Removal of dental plaque from teeth is required to keep the dental tissues disease free. Methods for maintenance of oral hygiene are mechanical and chemical or a combination of both thereof. One of the most common mechanical methods used for removal and control of plaque is brushing of teeth using tooth brush with nylon bristles and a dentrifice.^{2,3} In many third world countries and rural areas, chewing stick known as miswak, is used for maintaining oral hygiene instead of toothbrushing due to either religious reasons or no availability of toothbrushes and dentrifice.⁴

The main reason for selection of miswak in Pakistan is that the poverty ratio is 39.3% which is a lot more as compared to western developed countries.

Miswak is a short wooden stem that is cut from trees with special properties. It must be from a young

stem which has a soft bark with spongy inner core, which can easily be crushed between teeth.⁵ The crushed root easily swells and becomes soft whenever it is immersed in water. The softer part of the miswak is then rubbed over the teeth in a random manner to clean the teeth.⁶ The most common type of miswak is derived from *Salvadorapersica*, which is a small tree or shrub.

Miswak was prehistorically used by the early Arabs, Babylonian, Greek, and Roman societies for maintenance of oral hygiene.⁷ Chemical examinations revealed that these sticks contain natural ingredients, which are beneficial for health. It contains many organic chemicals which have the potency to heal the inflamed and bleeding gums, such as fluoride, chloride, ascorbic acid, tri-methylamine, resins, silica and salvadorine. The chemicals also help in removing tartar and stain from the teeth and stimulate salivary flow. The remineralizing effect hardens enamel thus rendering it resistant to caries.⁸

There is limited data available for the oral hygiene status of Pakistani population using miswak. This study was under taken to find the oral hygiene status of Pakistani population and find its effectiveness in comparison to tooth brushing which is already an established oral hygiene aid.

Correspondence: Dr Mubashir Sharif, Assistant Professor, Prosthodontics Department, 21 MDC, CMH Quetta Pakistan
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METHODOLOGY

This was a cross sectional descriptive study with non-probability consecutive sampling technique. The study was initiated after approval from ethics committee (AFID/ERC/2020/07), from August 2020 to January 2021 and was done in the Oral diagnosis department of Armed Forces Institute of Dentistry.

Inclusion Criteria: The patients were selected between the ages of 18 and 60 years, both genders, either using toothbrush with tooth paste for cleaning teeth or use miswak and, not both, had been using oral hygiene aid for at least 3 months, no medical conditions like diabetes, hypertension etc. and no oral habits like smoking, beetlenut chewing etc.

Exclusion Criteria: Subjects having multiple missing teeth or wearing a prosthesis were excluded.

A total of 300 subjects were included in the study. The sample size was calculated using WHO calculator. The parameters used for sample size calculation were: Confidence interval: 95%, anticipated population proportion: 32%, absolute precision required: 5%. Out of 300, 150 were those who used toothbrush with toothpaste (group A) and 150 were those who used miswak (group B) for cleaning teeth. After the written consent of the subjects, Plaque Index (Loe and Sillness)¹⁰ was used to measure the degree of cleanliness of teeth. The teeth were divided in 6 sextants i.e 17 to 14, 13 to 23, 24 to 27, 37 to 34, 33 to 43, and 44 to 47 (according to FDI tooth numbering system). Buccal surface of all teeth in each sextant were examined and scored according to Plaque Index. The highest score for each sextant was recorded. The mean of those scores was considered as the overall score for that sample.

The study was conducted as a single blind study where the researcher selecting the subjects knew about the oral hygiene aid, however, the researcher measuring the Plaque Index was not aware of this fact. In this way bias was prevented.

The Plaque Index is as follows: grade 0-no plaque, grade 1-thin plaque layer at the gingival margin, only detectable by scraping with a probe, grade 2-moderate layer of plaque along the gingival margin; interdental spaces free but plaque is visible to the naked eye, grade 3-abundant plaque along the gingival margin; interdental spaces filled with plaque.

The highest score for each subject was recorded. The data was analyzed using SPSS 23. Means and standard deviations were calculated for age and Plaque Index score for both, tooth paste users (group A) and

miswak users (group B) groups. Frequency was calculated for gender. Independent sample t-test was used to compare gender with Plaque Index scores and paired sample t-test was used to compare age with plaque index scores. p -value < 0.005 was considered significant.

RESULTS

The mean age of the sample was 41.27 ± 18.03 years. The gender distribution was 140 (46.7%) males and 160 (53.3%) females. Plaque Index scores were recorded for both groups and mean and standard deviation was calculated as shown in Table-I.

The comparison between the Plaque Index Scores of the two groups (group A and group B) showed no significant difference with p -value of 0.083.

There was no significant correlation of gender with the plaque index score, whereas there was significant correlation of age with plaque index score (Table-II).

Table-I: Mean plaque index score.

	Group A Toothbrush Users n=150	Group B Miswak Users n=150
Mean plaque index score (Mean \pm SD)	0.96 \pm 0.58	0.98 \pm 0.56

Table-II: Correlation of gender and age with plaque index scores.

Gender-Plaque Index Score (Mean \pm SD)	Independent Samples t-test	-1.744
	p -value	0.083
Age(in Years)-Plaque Index Score (Mean \pm SD)	Paired Samples t-test	38.640
	p -value	0.000

DISCUSSION

This study was done to determine if miswak was as effective in cleaning the teeth as toothbrush. As a large population of the world uses miswak as the only aid for oral hygiene, determining its effectiveness is of paramount importance. A method with poor plaque control can lead to caries and periodontal disease in the individuals.³ A stick of around 15cm long with one end peeled upto 1cm, of a variety of trees, is used as miswak. The peeled end is chewed to make it soft and then rubbed over the teeth to perform the cleaning action. The antibacterial effect of miswak is effective against the microorganism causing disease in oral cavity like *Streptococcus mutans* and *Candida albicans*.¹¹

Our study showed that the average score of the Plaque Index was close to grade 1 which is mild plaque which is only detectable by scraping with probe. This amount of plaque does not cause any disease

process and can be eliminated with improving the oral hygiene.¹²⁻¹⁴

Toothbrushing and miswak use had similar cleaning effectiveness as shown by non-significant difference between the Plaque Index Scores for both groups. Malik *et al*, also had similar results in a randomized control trial, in which the comparison of Plaque Index scores between miswak and toothbrush users revealed nonsignificant result ($p < 0.0001$).¹⁵ Mustafa *et al*, and Pachava *et al*, compared the caries rate between miswak and toothbrush users. They found that miswak users had significantly less rate of caries than tooth-brush users.^{16,17}

On the other hand, miswak use has been linked to gingival recession and wear of teeth. This may be attributed to increased use (>5 times daily), uncontrolled force application, or improper softening of the end. Use of miswak in maintaining oral hygiene in orthodontic patients has also been shown.¹⁹

This study highlighted the efficacy of miswak as an oral hygiene aid but further research is needed on aspects like the plant varieties that can be used, techniques and timings and the chemical effects.

CONCLUSION

Within the limitations of this study, it is concluded that, no significant difference was found in the effectiveness of traditional miswak and tooth brush. It is recommended that if the technique of teeth cleaning is good then any of the above-mentioned means of teeth cleaning can be used.

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Conflict of Interest: None.

Authors' Contribution

HAM: Literature review, data design, MS: Data collection, AA: Data collection, MS: Data collection, MQ: Manuscript writing, AA: Manuscript writing, editing.

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