

Assessment of Oral Hygiene Practices and the Factors Influencing Selection of Tooth and Interdental-Cleaning Devices: A Cross Sectional Survey of Pakistani Adults

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ABSTRACT

Objective: The current study aimed at determining and characterizing the oral hygiene habits and behaviors of a subset of Pakistani population seeking dental care at a private hospital in Karachi.

Study Design: Cross-sectional survey.

Place and Duration of Study: The study was conducted in the department of Oral Medicine and Diagnosis in Dental Out-Patient-Department of Ziauddin University Karachi from January 2022 to July 2022.

Methodology: A total of 530 adult males and females who visited Ziauddin Dental Out-patient-department (OPD) were recruited using non-probability consecutive sampling, as a representative sample of the Pakistani population. After obtaining an informed consent, interviews using a structured questionnaire were conducted. Data analysis was performed with SPSS version 22.

Results: The majority of the subjects interviewed (58.3%) use toothbrush, while 5.8% use miswak, 23.2% use both toothbrush and miswak, and 5.5% use their fingers to clean their teeth. There was no significant difference in selection of oral hygiene device between genders, age groups, level of education, and social economic status. To clean interdental areas, majority participants use toothpicks (39.6%), 13.4% use dental floss, 4.5% use interdental brush while 34.1% use none. 14.3% of the participants reported that they use a mouth-rinse.

Conclusion: An assessment of oral hygiene practices serves as a guide for designing effective health education programs that fulfils the periodontal requirements of the target population. Efforts should be made to promote the correct brushing techniques and timings and implement the usage of interdental cleaning aids.

Keywords: dental health education, miswak, toothbrushing, floss, mouth rinse

INTRODUCTION

Good oral health positively impacts an individual's overall health, hygiene, social well-being as well as quality of life ¹. For periodontal health maintenance and successful non-surgical and surgical periodontal therapy, effective plaque removal at regular intervals is necessary ². After thorough and effective scaling and root planing, in the absence of plaque control, subgingival recolonization occurs within four to eight weeks ³.

People have been brushing their teeth through ancient times, with earlier reports suggesting the use of chalk ashes, salt and piece of abrasive cloth and water for cleaning teeth ⁴. The "miswak" also known as "siwak", used by the Babylonians almost 7000 years ago, is the precursor to toothbrush that continues to be used in many parts of Middle East and South Asia as the traditional means for oral hygiene ⁵. The Miswak is prepared by cutting the roots or twigs into 15 cm length sticks, the end of which is chewed to separate the fibers until they become like the bristles of a normal toothbrush, which can be then used to brush the teeth ⁶. Based on its proven therapeutic benefits, attributed to a combination of the mechanical cleansing effect of its fibrous component and the release of certain biologically active chemicals, the WHO declared that it recommends and encourages the practice of using miswak chewing sticks as an oral hygiene tool ⁷.

Currently toothbrushing is the most widely accepted and effective oral hygiene method ⁸. The regular or manual toothbrush is an easily available, effective, and affordable device. Powered or electric toothbrushes are tools were introduced in the 1940s and have undergone advancements ever since ⁹. They contain an electromotor which propels the brush head when switched on. Current evidence suggests that electric toothbrushes are reduce plaque more efficaciously compared to manual toothbrushes in both short and long term ¹⁰. For both types of brushes, however, the effectiveness of plaque removal is dependent upon many factors, including filament size, orientation, material, flexibility, arrangement, in addition to the size and shape of the brush head.

Despite optimally cleaning the facial surfaces, toothbrushing is not effective at removing plaque in the interproximal surfaces,

leaving as much as 40% of the plaque ¹¹. This is significant because the interproximal areas, especially of the premolars and molars, are at a higher risk of plaque accumulation, which may eventually result in periodontal disease and/or dental caries ¹². To aid in plaque control in the interproximal areas, various interdental cleaning devices are available, including dental floss, interdental brushes, wooden toothpicks. A study by Marchesan et al. reported that interdental cleaning was associate with reduced periodontal disease and interproximal caries ¹³.

The adjunctive use of chemotherapeutic agents, such as mouth rinses and toothpastes, assist in the removal of plaque and reduction of gingivitis. In a systematic review and meta-analysis Serrano et al reported that significant reduction in plaque and gingivitis indices were noted when formulations of toothpastes and mouth rinses with plaque controlling properties were prescribed ¹⁴.

Consumers' decisions regarding their oral hygiene tools are influenced by personal preferences, manual dexterity, cultural values, social status and affordability, motivation and psychological factors¹. In Pakistan, where oral health care facilities are limited and there is poor oral health education high prevalence of oral diseases has been reported ¹⁵. According to Mirza et al., high prevalence of oral disease in Pakistani population is the result of lack of prevention and control ¹⁶, which can be counteracted by an increase in oral health awareness and educational programs ¹⁷.

Good oral hygiene is the basis of maintaining a healthy, disease-free mouth. An assessment of the adolescent's oral hygiene behaviour and the factors influencing it forms the basis for the development of effective oral health programme. This cross-sectional study aims to assess oral health preference and practices among patients and attendants visiting Ziauddin Dental Hospital, and to evaluate what factors make an individual select miswak and/or toothpaste and mouth rinses.

METHODOLOGY

A cross sectional survey was carried out in the department of Oral Medicine and Diagnosis in Dental Out-Patient-Department of Ziauddin University Karachi from January 2022 to July 2022.

Ethical approval for the study was obtained from the Ethical Review Committee at Ziauddin University (Reference code: 4120821THOM).

The sample size was calculated using Open Epi software. The formula for sample size for cross sectional studies was taken as:

$$N = \frac{(Z)^2 \times P(1-P)}{d^2}$$

Prevalence (p) was taken at 50% bond of error at 5% and confidence level of 95%. The sample size calculated was 384.

A total number of 530 males and females aged 18 to 68 years were recruited using non-probability consecutive sampling. Inclusion criteria included the ability to provide an informed consent, aged 18 to 70 years and possessing sufficient language skills to answer the questionnaires in either English or Urdu. Those with fixed orthodontic appliances, removable dentures and any physical or mental impairment affecting oral hygiene measures were excluded. All participants filled an informed consent prior to enrollment into the study.

The data was analyzed by using SPSS version 22. Frequencies and percentages were calculated to represent the demographic participation of the study participants. Chi-square analysis was performed to associate the independent variables (teeth cleaning devices) with dependent variables (factors responsible for selection of particular teeth cleaning device). The data was analyzed at 95% confidence interval and p-value less than 0.05 was considered as significant.

RESULTS

A total of 530 participants filled the proforma for the study. Among them the males were 271 (51.1) and female were 259 (48.9%). Age ranged from 18 to 69, with mean age of 44.24 ±13.48 years. Most of the participants n=160 (30.2%) were graduates (16 years education). The socioeconomic status of the participants was

evaluated by their monthly income about n=130 (24.5%) reported that they earn 10,000-29,999PKR per month.

Out of the total of 530 participants 309 (58.3%) participants selected toothbrush as their preferred device, n=123 (23.2%) marked both toothbrush and miswak, while only n=31 (5.8%) mentioned that they use miswak (figure 1).

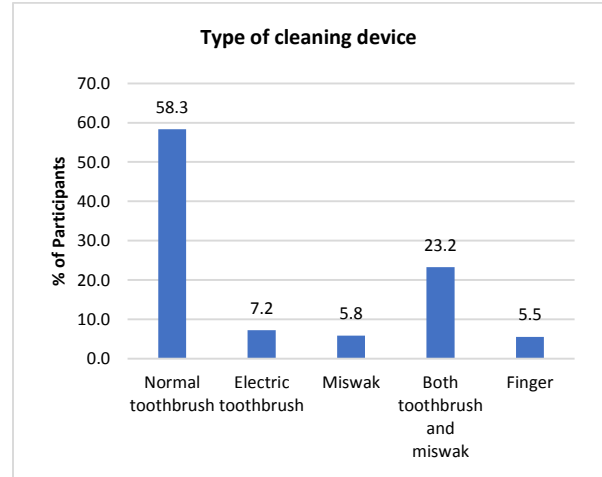


Figure 1: Type of cleaning teeth used by all study participants (n=530)

Table 1 represents the association of demographics with selection of teeth cleansing device, reporting that irrespective of gender, educational level, socioeconomic status, and religion, normal toothbrush was the oral cleansing device of choice for most participants(p = 0.001).

Table 1: Association of demographics of study participants with type of tooth cleaning device Values in bold have significant findings

Demographic variables		Normal toothbrush (n=309, 58.3%)	Electric toothbrush (n=38, 7.2%)	Miswak (n=31, 5.9%)	Both toothbrush and miswak (n=123, 23.2%)	Finger (n=29, 5.5%)
Gender	Female	177	33	8	37	16
	Male	132	5	23	86	13
Education Level	Primary	32	0	4	20	12
	Secondary	56	5	1	25	6
	Intermediate	56	0	18	30	9
	University	115	21	4	20	0
	Post-graduate	52	12	4	28	0
Monthly household income	Less than 10,000 PKR	52	0	8	16	12
	Between 10,000 and 29,999 PKR	82	0	6	37	5
	Between 30,000 and 49,999 PKR	54	0	9	25	4
	Between 50,000 and 99,999 PKR	66	12	8	25	8
	Between 100,000 and 500,000 PKR	32	20	0	12	0
	Greater than 500,000 PKR	23	6	0	8	0
Religion	Islam	274	32	31	111	21
	Christianity	19	2	0	0	4
	Hinduism	14	2	0	0	4
	Sikhism	2	2	0	0	0
		2	2	0	0	0
Smoking Status	Current smoker	48	8	12	20	8
	Past smoker	25	4	16	33	5
	Never smoked	236	26	3	70	16

Table 2: Factors associated with toothbrushing (n=309)

Reason for using toothbrushes	Freshness and easy availability	Freshness	Easy availability	Better cleaning and freshness	Better cleaning and easy availability	p-value	
1	159 (51.5%)	2 (0.6%)	17 (5.5%)	45 (14.6%)	77 (24.9%)	9 (2.9%)	0.004*
2	Reason for selecting particular toothpaste	Anti-bleeding/gum protection	Anti-cavity	Fresh breath	Anti-bleeding and fresh breath		
	52 (16.8)	212 (68.6%)	35 (11.3%)	4 (1.3%)	6 (1.9%)		0.001*
3	Frequency of brushing teeth	Once a day	Twice or more a day	Twice or more a day			0.055
	150 (48.6%)		142 (46%)	17 (5.5%)			
4	Direction of brushing	Vertical scrub	Horizontal scrub	Vibratory with brush placed at 45° angle	Circular	Randomly	
	28 (9.1)	46 (14.9%)	21 (6.8%)	150 (48.6%)	64 (20.7%)		0.021*

Out of the 309 participants that marked toothbrush as preferable choice for cleaning the teeth, the most common reason behind the selection was better cleaning (51.5%, $p=0.004$). The most common reason for selection of a particular paste was its anti-bleeding/gum-protecting properties ($n=212$, 68.6%). Most of the participants mentioned that they use circular direction ($p=0.021$) while cleaning the teeth with toothbrush. There was no any significant difference in frequency of brushing however, 150 (48.6%) participants mentioned that they brush their teeth once daily. Table 3 highlights the association of brush as teeth cleansing device and its factors.

There were only 31 (5.8%) participants who mentioned miswak as preferable teeth cleaning device. The reason for choosing miswak for 61.3% miswak-users was religious association ($p=0.049^*$) and for 38.7% was better cleaning. The frequency of miswak usage was twice a day by $n=16$ (51.6%) and thrice or more in a day for $n=10$ (32.3%). Stem of Kikar (*Acacia arabica*) was the preferred choice of miswak among the study participants followed by neem (*Azadiracheta Indica*).

Out of the total of 530 participants, 210 (39.6%) reported using toothpicks to clean the interdental area while 180 (34.1%) reported as using none. The usage of interdental cleaning aids is mentioned in Figure 2. Only 14.3% of participants used a mouthwash (Figure 3).

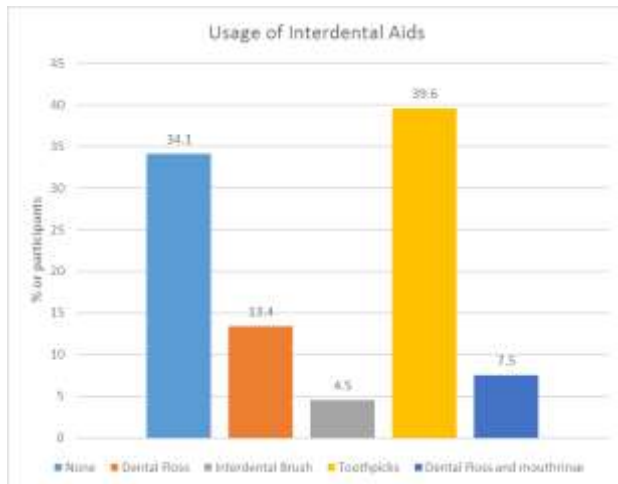


Figure 2: Distribution of interdental cleaning aids used by study participants ($n=530$)

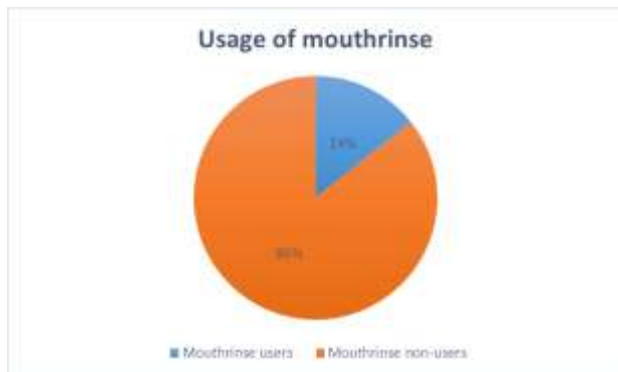


Figure 3: usage of mouth rinse by study participants ($n=530$)

Furthermore, there was no difference among the factors associated with the selection of electronic brush, miswak and brush. There was no any association of education, monthly income and religion for the selection of particular teeth cleaning device.

DISCUSSION

Many approaches in preventive dentistry are geared towards improving oral health by influencing positive oral hygiene behavior through intervention and instruction. The current study reports the oral hygiene pattern of the general population that visited a dental hospital in Karachi, Pakistan. While the findings of a single-centre study cannot be extrapolated to the entire Pakistani population, it is worth noting that the total number of participants was quite large ($n=530$).

The present study reports that the preferred teeth cleansing device of Pakistani adults was toothbrush ($n=309$, 58.3% of the total participants). The reason behind selection of toothbrush over other cleansing aids was cited as greater better cleaning (51.5%) along with freshness (24.9%). Only 38 participants used electric toothbrush, which might be attributable to its low availability and higher costs. In Pakistan and other Muslim countries, the use of traditional chewing stick or “miswak” is well recognised. In our study a total of 154 participants (29%) used miswak for cleaning their teeth; out of which 31 (5.8%) used miswak alone while 123 (23.2%) used it in addition to toothbrushes. This is comparable to a study done in Jordan, where 72% participants use toothbrushes, 20.5% miswak-plus-toothbrush while 3% used miswak only¹⁸.

It is often reported that oral hygiene behaviour is strongly influenced by various social and demographic factors, including gender, social status and level of education¹⁹. However our study failed to report any such correlation, with all different subsets exhibiting a preference for toothbrush for teeth cleaning.

Of all the brushing techniques, the roll and bass techniques are most preferred by dentists, because of superior cleansing abilities with minimal gingival trauma. In the present study, however, only a few participants utilised this technique, while most preferred circular or Fone’s technique (48.6%) and random brushing (20.7%). Evidence suggests that brushing twice a day (after breakfast and before going to bed) leads to better plaque control. In our study, out of the 309 participants that brush their teeth, 48.6% brush their teeth once a day while 46% brush twice a day. These findings are suggestive of poor oral hygiene practices among the population, which could be a contributing factor to the high prevalence of periodontal disease.

While toothbrushing has proven efficacy in terms of mechanical plaque control, it does not remove plaque adequately from the interdental areas, leaving them prone to interproximal cavities and interdental clinical attachment loss²⁰. This necessitates the use of interdental cleaning aids such as dental floss and interdental brushes. In our study 34.1% of participants did not use any interdental aids.

An American study reported that daily use of dental floss was seen in as low as 10 to 30% of the population, which they attributed to be due to lack of manual dexterity and motivation²¹. The current study reports that 13.4% of the population uses dental floss. Patients with low motivation and/or poor manual dexterity can benefit from the use of an easy flosser, which comprises of a handle with an inserted floss, that can be easily used to clean the interproximal area²².

The most used interdental aid was toothpicks, used by 39.6% of the population, while other aids were less common. Their popularity of toothpicks may be due to low cost, ease of use and availability²³. They assist in interdental plaque removal by providing friction against the proximal surfaces. They are, however, round in cross-section allowing only point contact with the tooth surface and are best used to remove food debris that wedge in the interdental area by older people with poorer manual dexterity²⁴.

Like toothpicks, interdental brushes are easy to use but owing to their size and shape their use should be limited to open embrasures²⁴. Studies report that interdental brush effectively removes plaque from the interproximal surfaces, are easy to use and exhibit higher motivation and compliance as compared to floss²⁵⁻²⁷. However, using the correct technique with interdental brushes is imperative and there is a shortage of correct sizes in Pakistan,

therefore the prescribing clinician must assess the size of open embrasures and provide specific instruction according to the case.

Conclusively, the current study is the first known attempt at reporting the oral hygiene practices of the Pakistani population and documenting the use of miswak and/or toothbrush as well as interdental aids. It highlights the need for evidence-based dental health education to address the gaps that exist regarding timing and technique of toothbrushing and the use of interdental teeth cleaning devices and mouthwashes. Research in public health sector places strong significance on the need for structural interventions to address the inequalities in healthcare and improve overall health. Implementation of dental health education programs in a community-based approach will help provide a foundation for oral health intervention and prevention strategies and will be the first step towards controlling periodontal diseases, which are highly prevalent in this part of the world.

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