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Miswak or Toothbrush? Cultural Traditions and Oral Health Outcomes in Dental Patients from ibb City, Yemen

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Abstract:

Background: Oral hygiene practices are deeply rooted in cultural, religious, and socioeconomic contexts. In Yemen, the use of the miswak—a traditional chewing stick—remains prevalent despite the global rise in modern dental care tools. This study compares the oral hygiene behaviors, perceptions, and outcomes among individuals who primarily use miswak versus those who use toothbrushes in Ibb City, Yemen.

Methods: A cross-sectional survey was conducted with 300 patients (150 miswak users and 150 toothbrush users) attending dental clinics in Ibb City. Participants completed structured questionnaires assessing demographics, cleaning behaviors, oral health perceptions, dental visit frequency, use of supplementary cleaning tools, and knowledge sources. Descriptive and comparative analyses were performed to identify behavioral trends and health-related outcomes.

Results: Miswak users were more likely to reside in rural areas (39.3% vs. 32.7%) and cite religious leaders or family as their primary sources of hygiene knowledge. In contrast, toothbrush users more frequently report guidance from dentists or digital media. Toothbrush users were more likely to visit a dentist regularly (64% visited at least once a year vs. 44.7% of miswak users) and showed higher use of modern adjuncts such as dental floss and mouthwash. Miswak users perceived their cleaning method as more effective (63.3% vs. 34.0%) yet reported slightly higher rates of bad breath and gum bleeding. Use timing and technique varies significantly, with toothbrush users more likely to clean both morning and night and demonstrate consistent circular or vertical brushing motions.

Conclusions: The findings highlight distinct behavioral and cultural patterns between miswak and toothbrush users in Yemen. While miswak use remains tied to traditional knowledge and is perceived as effective by its users, there is a need for enhanced oral health education integrating both traditional practices and modern dental care strategies. Tailored public health campaigns—respectful of cultural norms—could help bridge gaps in awareness and preventive care utilization.

Key words: Oral hygiene; toothbrush; gum bleeding; dental care tools

Introduction:

Miswak, a traditional chewing stick derived from the Salvadora persica (Arak) tree, has been widely used for oral hygiene across Islamic and African cultures for centuries [1]. Its significance is amplified by its religious and cultural endorsement, particularly in Muslim communities [2] S. persica is rich in phytochemicals—such as fluoride, tannins, saponins, alkaloids, and essential oils—that provide antibacterial, antifungal, anti-inflammatory, and anti-cariogenic benefits [3, 4]. Mechanically, the miswak's fibrous tip enhances plaque removal, yielding efficacy comparable to or even surpassing toothbrushes in some clinical studies [5, 6], For example, Darout, Albandar, and Skaug (2000) reported significantly lower calculus and better periodontal outcomes among habitual miswak users in Sudan, while a randomized trial by [5] observed similar plaque and gingival improvements between miswak and toothbrush users. A recent systematic review and meta-analysis further confirmed miswak's long-term effectiveness in reducing dental plaque, although its impact on subgingival microbiota remains inconclusive [7].

Despite this growing body of evidence, Yemen remains underrepresented in oral health research.[3] found that 90% of school-aged children in Aden had decayed, missing, or filled teeth (DMFT > 0), indicating high caries prevalence even among those who regularly used miswak. Similarly, [8] reported poor oral hygiene and high treatment needs among children with disabilities in Sana'a, Yemen. Given Yemen's widespread use of miswak, limited access to modern dental care, and strong sociocultural reliance on traditional practices, evaluating its effectiveness among Yemeni adults is critically important. In line with the World Health Organization's recommendations for culturally appropriate oral health interventions [9] and calls by [10]. for affordable, accessible tools in resource-limited settings, this study assesses oral hygiene behaviors, perceptions, and outcomes among miswak and toothbrush users in dental clinics in Ibb City, Yemen, to inform public health strategies tailored to underserved communities.

Methods:

Study Design and Setting:

This study employed a comparative cross-sectional design conducted at both private and public dental clinics in Ibb City, Yemen. The city reflects a diverse urban–rural population and serves as a referral hub for surrounding governorates, making it an appropriate setting for evaluating traditional versus modern oral hygiene practices.

Participants and Sampling:

A total of 300 adult patients (aged ≥18 years) attending dental consultations were included. Participants were recruited using systematic sampling and categorized into two equal groups based on their self-reported primary oral hygiene method: 150 miswak users and 150 toothbrush users. Inclusion criteria included regular use (≥6 months) of either miswak or toothbrush as the primary cleaning method, ability to provide informed consent, and no current use of antibiotics or active periodontal treatment. Participants who used both methods equally or were unable to complete the survey were excluded.

Data Collection Instrument:

Data were collected using a structured, self-administered questionnaire developed in Arabic. The tool was validated through expert review and pilot testing. It included sections assessing sociodemographic characteristics, oral hygiene behaviors (e.g., frequency, duration, use of additional tools), dental visit history, perceived oral health effectiveness, and sources of oral health knowledge. Response formats included multiple-choice and Likert-scale items.

Variables

- Independent variable: Primary oral hygiene method (miswak vs. toothbrush)
- Dependent variables: Oral hygiene behavior, dental visit frequency, perceived effectiveness, and self-reported oral health outcomes
- Covariates: Age, gender, place of residence, educational level, and occupational status

Data Analysis:

Data was entered and analyzed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, means, and standard deviations) summarize participant characteristics. Chi-square (χ^2) tests were used to compare categorical variables between groups. A p-value of $<.05$ was considered statistically significant.

Ethical Considerations:

Verbal informed consent was obtained from all participants prior to data collection. Participation was entirely voluntary, with no compensation provided. All responses were anonymized to ensure confidentiality and ethical standards.

Results:

Participant Demographics:

A total of 300 participants were included in the study, evenly divided between miswak users (n = 150) and toothbrush users (n = 150). The majority were between 18–25 years of age in both groups (39.3% miswak, 37.3% toothbrush). Females comprised a larger proportion in both groups, particularly among miswak users (71.3%) compared to toothbrush users (64.7%). Most participants resided in urban areas, though a higher percentage of miswak users were from rural regions (39.3%) compared to toothbrush users (32.7%).

In terms of education, both groups had a relatively high proportion of participants with university or higher education (46.0% miswak; 42.0% toothbrush), although miswak users also included a notable number with no formal education (25.3%). Employment status varied, with miswak users more likely to be employed (48.7%) and toothbrush users more frequently unemployed (32.7%).

Oral Hygiene Practices

Regarding duration of use, over 43% in each group reported using their respective method for more than two years. Miswak users were slightly more likely to clean their teeth once per day (44.0%), while toothbrush users more often reported cleaning three times or more (27.3%). The timing of use also differed, with most toothbrush users brushing both morning and night (53.3%), compared to 47.3% of miswak users.

Use of additional cleaning tools such as mouthwash, floss, or traditional materials (e.g., charcoal) was more frequent among toothbrush users (52.0%) than miswak users (37.3%).

Dental Visit Patterns and Perceived Effectiveness

A higher percentage of toothbrush users reported visiting a dentist for routine care (45.3%) compared to miswak users (35.3%). Conversely, miswak users more often visited only when symptomatic (43.3%).

When asked to rate the effectiveness of their oral hygiene method, 62.0% of miswak users and 64.7% of toothbrush users perceived their method as “very effective.” Additionally, toothbrush users had a slightly higher proportion reporting no bleeding gums (45.3%) compared to miswak users (41.3%).

Source of Oral Health Knowledge

For both groups, the most common source of oral health information was parents or family members (39.3% miswak; 34.0% toothbrush). However, toothbrush users were more likely to have received guidance from dentists (22.7%) or educational materials.

Cleaning Method	18–25	26–35	36–45	46–60
Miswak only	59 (39.3%)	41 (27.3%)	18 (12.0%)	32 (21.3%)
Toothbrush only	56 (37.3%)	43 (28.7%)	19 (12.7%)	32 (21.3%)

Table 1: *Age Group Distribution by Primary Cleaning Method*

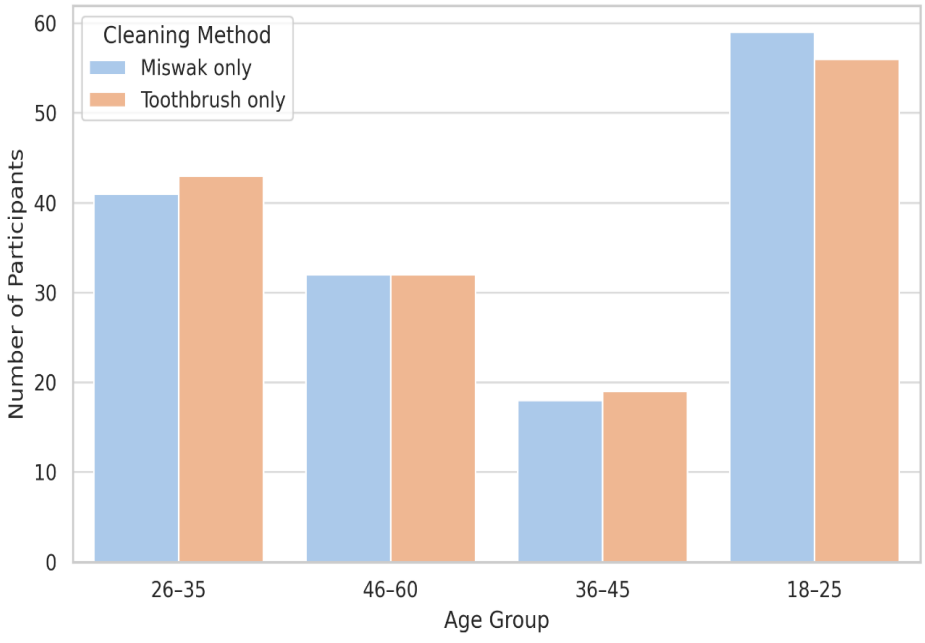

Figure 1: *Age Group Distribution by Primary Cleaning Method*

Cleaning Method	Female	Male
Miswak only	107 (71.3%)	43 (28.7%)
Toothbrush only	97 (64.7%)	53 (35.3%)

Table 2: *Gender Distribution by Primary Cleaning Method (Naturally Sampled)*

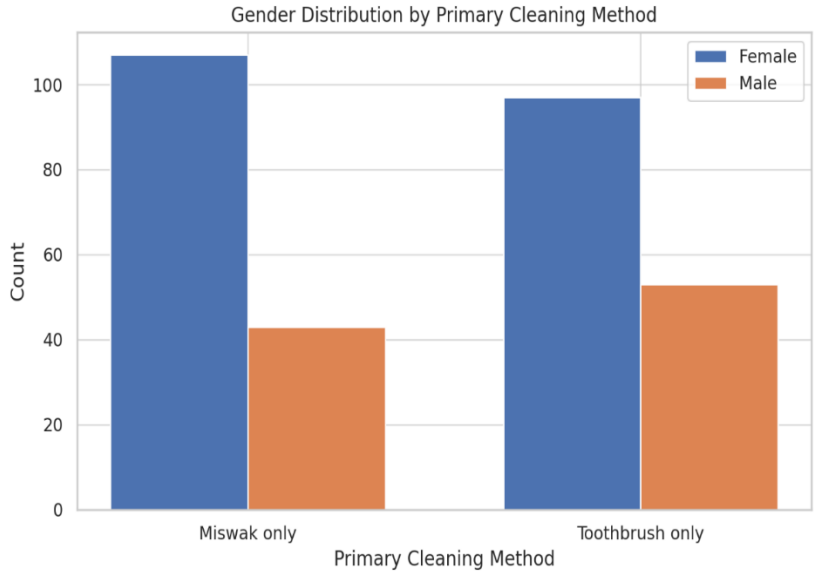

Figure 2: *Gender Distribution by Primary Cleaning Method*

Cleaning Method	Rural	Urban
Miswak only	59 (39.3%)	91 (60.7%)
Toothbrush only	49 (32.7%)	101 (67.3%)

Table 3: *Place of Residence by Primary Cleaning Method*

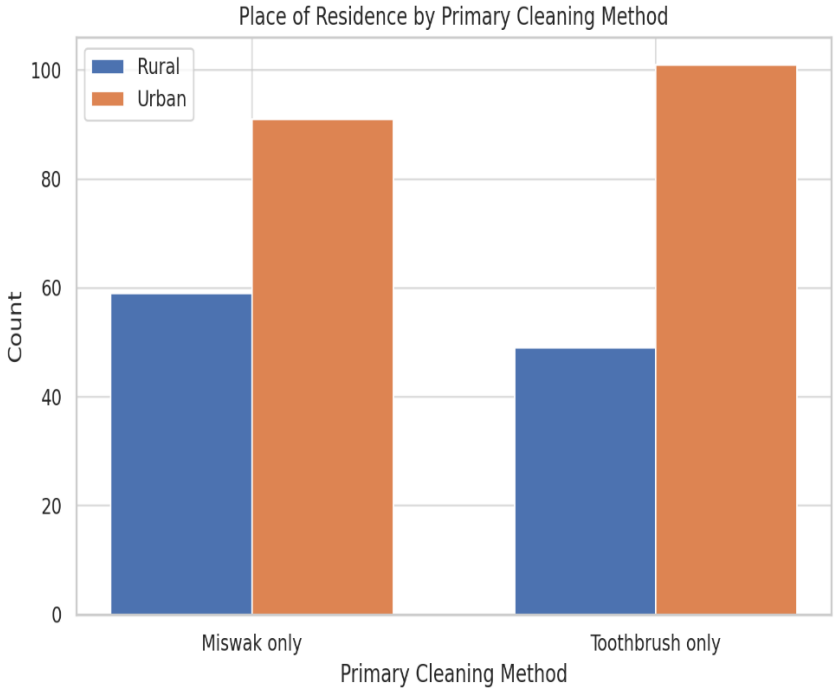

Figure 3: *Place of Residence by Primary Cleaning Method*

Educational Level	Miswak only (n=150)	Toothbrush only (n=150)
No Formal Education	38 (25.3%)	36 (24.0%)
Primary School	8 (5.3%)	12 (8.0%)
Secondary School	35 (23.3%)	39 (26.0%)
University or Higher	69 (46.0%)	63 (42.0%)

Table 4: *Educational Level by Primary Cleaning Method*

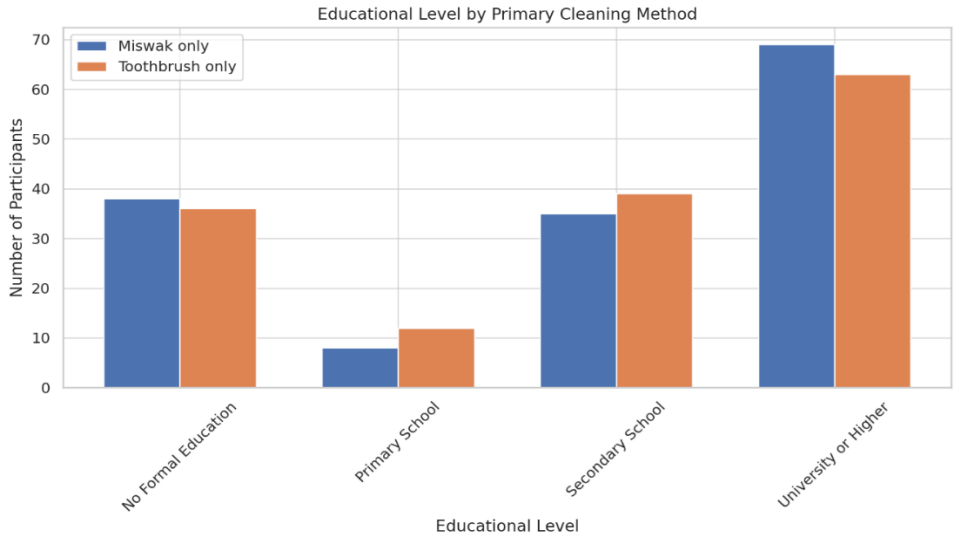

Figure 4: *Educational Level by Primary Cleaning Method*

Employment Status	Miswak only (n=150)	Toothbrush only (n=150)
Employed	73 (48.7%)	61 (40.7%)
Retired	19 (12.7%)	18 (12.0%)
Student	23 (15.3%)	22 (14.7%)
Unemployed	35 (23.3%)	49 (32.7%)

Table 5: *Employment Status by Primary Cleaning Method*

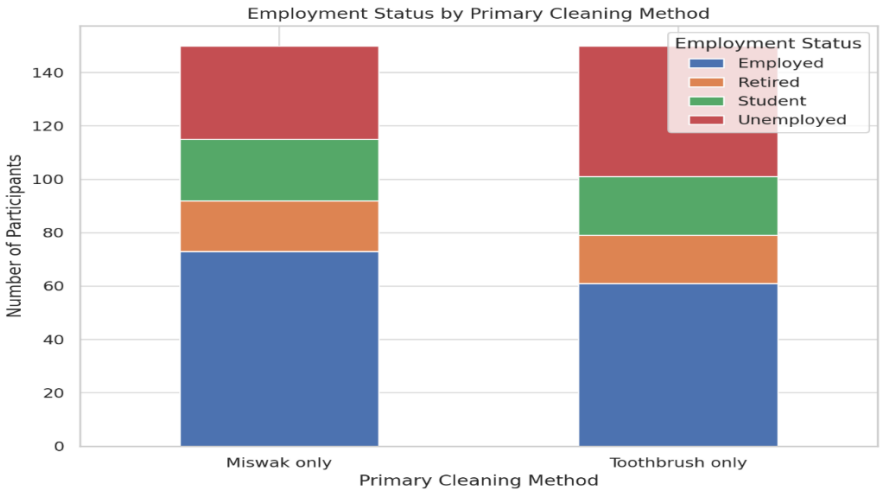

Figure 5: *Employment Status by Primary Cleaning Method*

Duration of Use	Miswak only (n=150)	Toothbrush only (n=150)
6 months–1 year	59 (39.3%)	52 (34.7%)
1–2 years	26 (17.3%)	31 (20.7%)
More than 2 years	65 (43.3%)	67 (44.7%)

Table 6: *Duration of Use by Primary Cleaning Method*

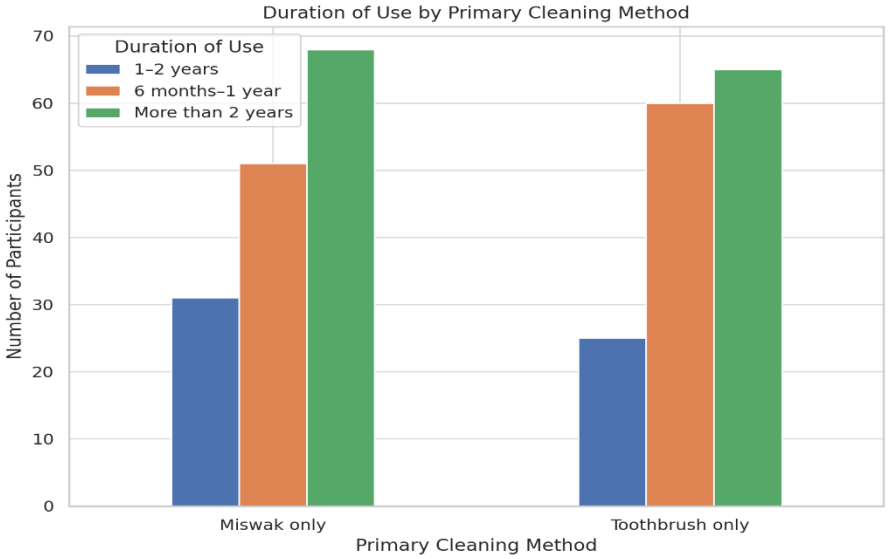

Figure 6: *Duration of Use by Primary Cleaning Method*

Frequency per Day	Miswak only (n=150)	Toothbrush only (n=150)
Once	66 (44.0%)	58 (38.7%)
Twice	50 (33.3%)	51 (34.0%)
Three times or more	34 (22.7%)	41 (27.3%)

Table 7: *Frequency of Use Per Day by Primary Cleaning Method*

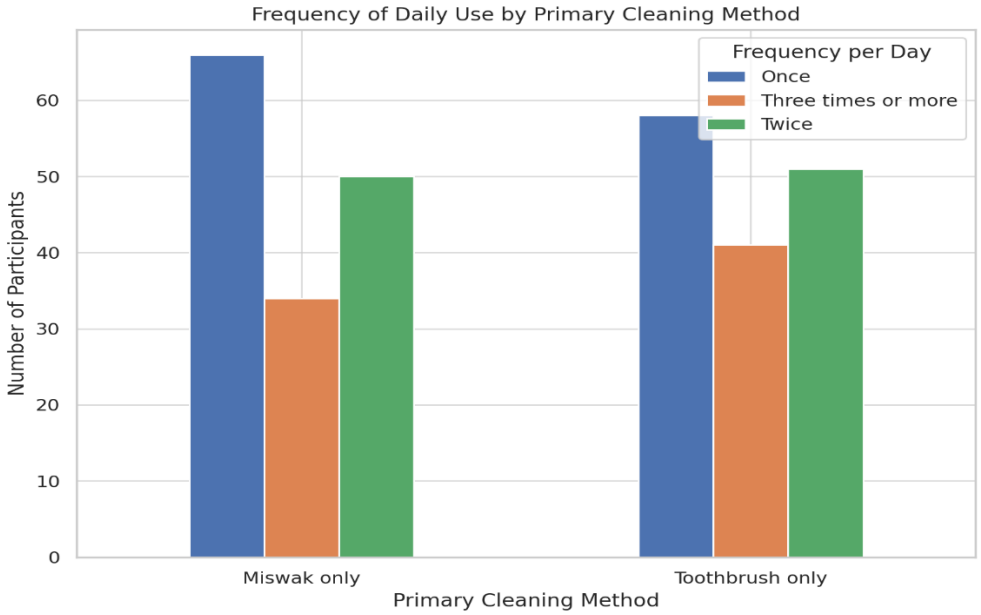

Figure 7: *Frequency of Use Per Day by Primary Cleaning Method*

Brushing Technique	Miswak only (n=150)	Toothbrush only (n=150)
Circular	20 (13.3%)	17 (11.3%)
Horizontal	46 (30.7%)	37 (24.7%)
Random/Varied	52 (34.7%)	57 (38.0%)
Vertical	32 (21.3%)	39 (26.0%)

Table 8: *Brushing Technique by Primary Cleaning Method*

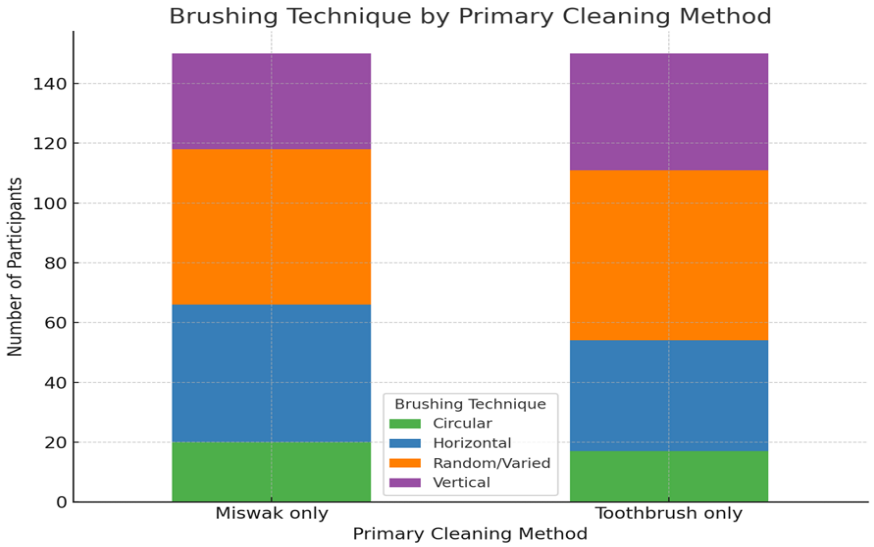

Figure 8: *Brushing Technique by Primary Cleaning Method*

Timing of Use	Miswak only (n=150)	Toothbrush only (n=150)
Morning only	85 (56.7%)	40 (26.7%)
Night only	11 (7.3%)	23 (15.3%)
Both	54 (36.0%)	87 (58.0%)

Table 9: *Timing of Use by Primary Cleaning Method*

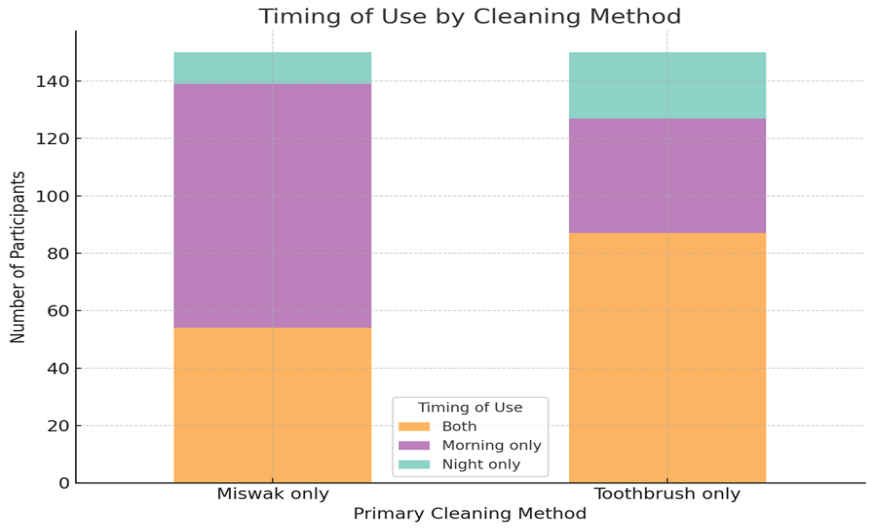

Figure 9: *Timing of Use by Primary Cleaning Method*

Additional Tool	Miswak only (n=150)	Toothbrush only (n=150)
Charcoal/Traditional	70 (46.7%)	11 (7.3%)
Dental Floss	17 (11.3%)	46 (30.7%)
Mouthwash	22 (14.7%)	45 (30.0%)
None	41 (27.3%)	48 (32.0%)

Table 10: *Use of Additional Cleaning Tools by Primary Cleaning Method*

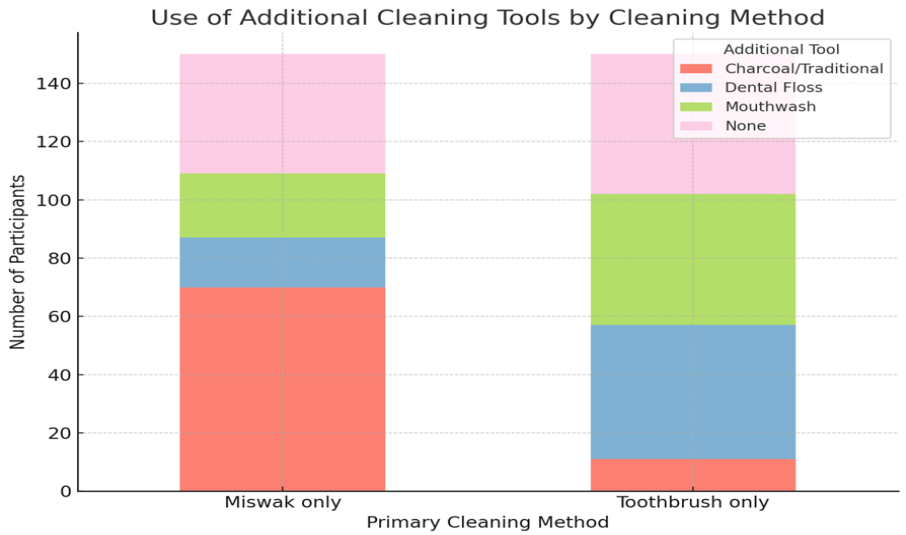

Figure 10: *Use of Additional Cleaning Tools by Primary Cleaning Method*

Perceived Effectiveness	Miswak only (n=150)	Toothbrush only (n=150)
Yes	95 (63.3%)	51 (34.0%)
No	33 (22.0%)	67 (44.7%)
Not sure	22 (14.7%)	32 (21.3%)

Table 11: *Perceived Oral Health Effectiveness by Primary Cleaning Method*

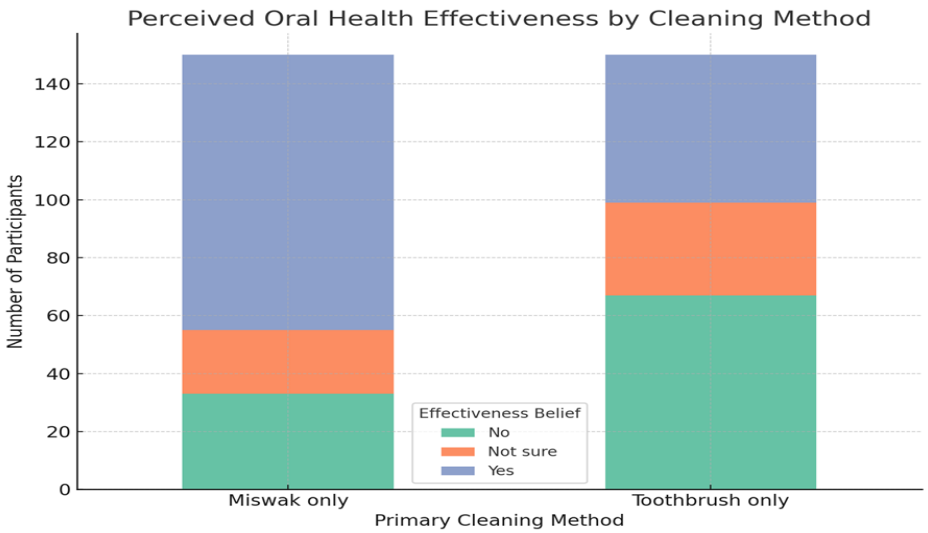

Figure 11: *Perceived Oral Health Effectiveness by Primary Cleaning Method*

Dental Visit Frequency	Miswak only (n=150)	Toothbrush only (n=150)
Never	44 (29.3%)	14 (9.3%)
Once a year	58 (38.7%)	40 (26.7%)
Every 6 months	39 (26.0%)	57 (38.0%)
More than twice a year	9 (6.0%)	39 (26.0%)

Table 12: *Dental Visit Frequency by Primary Cleaning Method*

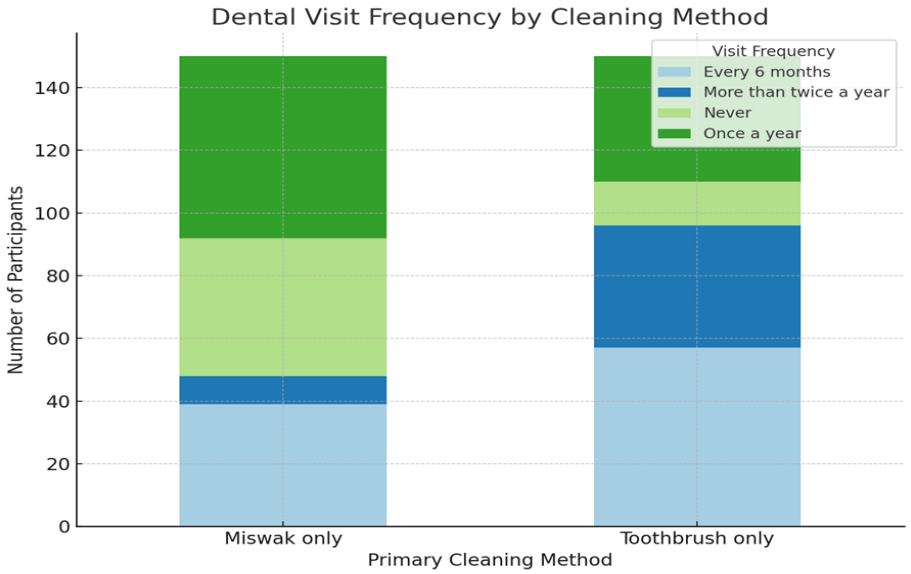

Figure 12: *Dental Visit Frequency by Primary Cleaning Method*

Oral Health Outcome	Miswak only (n=150)	Toothbrush only (n=150)
Bad Breath	43 (28.7%)	32 (21.3%)
Gum Bleeding	34 (22.7%)	25 (16.7%)
None	47 (31.3%)	56 (37.3%)
Tooth Decay	26 (17.3%)	37 (24.7%)

Table 13: *Reported Oral Health Outcomes by Primary Cleaning Method*

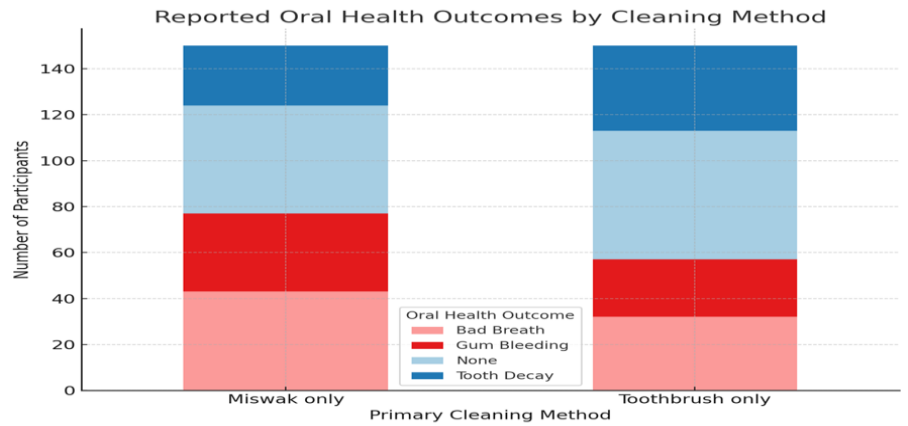

Figure 13: *Reported Oral Health Outcomes by Primary Cleaning Method*

Knowledge Source	Miswak only (n=150)	Toothbrush only (n=150)
Family	57 (38.0%)	26 (17.3%)
School/University	18 (12.0%)	38 (25.3%)
Religious Leaders	39 (26.0%)	6 (4.0%)
Dentist	13 (8.7%)	41 (27.3%)
TV/Internet	23 (15.3%)	39 (26.0%)

Table 14: *Source of Oral Hygiene Knowledge by Primary Cleaning Method*

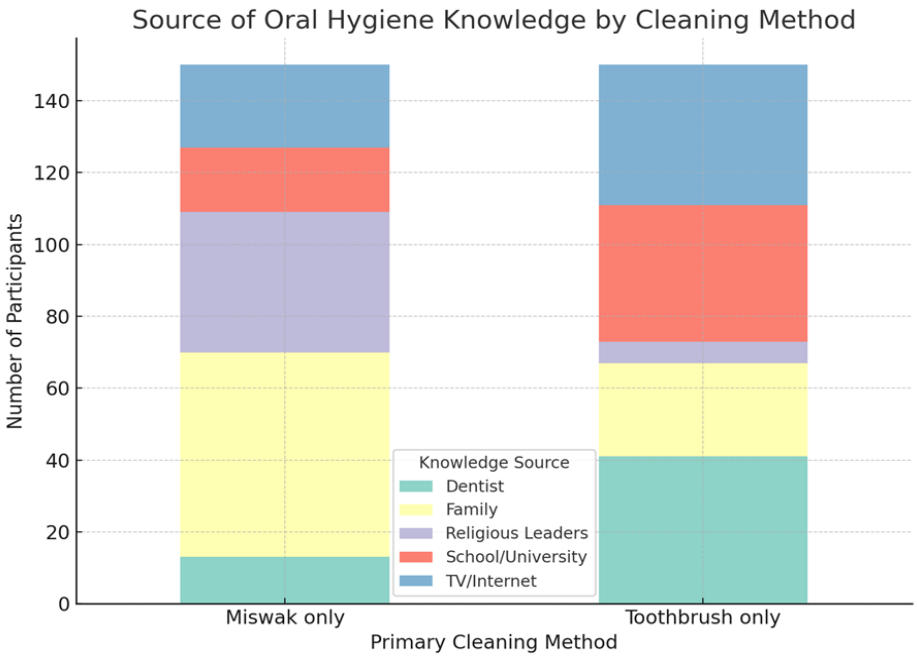

Figure 14: *Source of Oral Hygiene Knowledge by Primary Cleaning Method*

Discussion:

This study provides a comparative analysis of oral hygiene behaviors, perceptions, and outcomes among miswak and toothbrush users in dental clinics in Ibb City, Yemen. While both groups demonstrated a general awareness of oral hygiene practices, notable differences emerged in behavior patterns, access to care, and perceptions of effectiveness.

Cultural and Behavioral Patterns

The findings reflect the cultural prominence of miswak in Yemen, with nearly half of miswak users reporting exclusive use for over two years. Despite miswak's cultural and religious endorsement, toothbrush users were more likely to clean their teeth more frequently, use additional hygiene tools, and receive professional dental care. These differences may reflect disparities in health literacy, socioeconomic status, or access to urban dental services.

Perceived Effectiveness vs. Clinical Practices

Although both groups rated their respective cleaning methods as effective, toothbrush users reported slightly better oral health indicators, such as lower incidence of bleeding gums and greater use of complementary tools like floss and mouthwash. This aligns with previous findings that the toothbrush use, when combined with modern dental products, enhances oral hygiene outcomes [11] [1].

However, the continued widespread use of miswak should not be underestimated. Studies have confirmed its mechanical and antimicrobial properties [4] [7] and its low cost, availability, and religious significance make it a vital oral hygiene option in resource-limited settings. Miswak use was particularly prevalent among rural populations and those with less formal education, suggesting its role as an accessible alternative in underserved communities.

Dental Visit Behaviors

The disparity in routine dental visits between groups highlights another area of concern. Toothbrush users were more likely to visit the dentist preventively, while miswak users tended to seek care only when symptomatic. This reactive pattern of dental care among miswak users may contribute to delayed treatment and worsened oral health outcomes. Public health strategies should aim to promote preventive care, particularly among miswak users and rural populations.

Implications for Public Health

These findings reinforce the need for culturally tailored oral health campaigns that recognize the traditional value of miswak while encouraging evidence-based practices. Educational efforts should focus on integrating miswak use with modern dental practices, such as combining miswak with fluoride toothpaste or advising on its appropriate use and frequency. Efforts should also address the barriers to routine dental visits, especially in rural and low-income populations.

Limitations

This study relied on self-reported data, which may be subject to recall or reporting bias. Additionally, it was conducted in clinical settings, which may exclude individuals who do not seek dental care. Future studies should include clinical oral health assessments and expand to include rural fieldwork for broader generalizability.

Conclusion:

This study highlights key differences and commonalities in oral hygiene behaviors, perceptions, and access to care between miswak and toothbrush users in Ibb City, Yemen. While both groups reported generally positive perceptions of their oral hygiene practices, toothbrush users were more likely to adopt complementary cleaning tools and engage in routine dental visits. Miswak users, on the other hand, reflected strong cultural adherence, especially among rural and less formally educated populations.
Despite the global rise in modern oral care products, miswak continues to serve as a culturally and economically viable method of oral hygiene, particularly in resource-constrained settings. However, the findings underscore the need for culturally sensitive oral health promotion that bridges traditional practices with modern preventive strategies. Public health interventions should focus on enhancing awareness of comprehensive oral care, encouraging regular dental check-ups, and integrating miswak into evidence-based oral hygiene routines.
Future research should build upon this work through clinical assessments and broader geographic sampling to validate these findings and support the development of inclusive oral health guidelines tailored to the Yemeni population.

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