Prevailing oral hygiene practices among urban Saudi Arabians in relation to age, gender and socio-economic background

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The aim was to analyze prevailing oral hygiene practices among urban Saudi Arabians in relation to age, gender, and socio-economic background. Structured interviews were performed with 1155 regular patients at two centers providing dental care for university and military staff and their families, respectively, in the city of Makkah. Consecutive patients were stratified according to gender and age into 6 age categories from 10 to 60 years, with 50 male or female subjects in each group at each center. Oral hygiene habits were correlated with the subject's age and gender, and analyzed statistically using a generalized linear model. It was found that 73% used a toothbrush daily, while a miswak was used daily by 65%. Significant differences were found between genders and age groups, and between the centers. Regular miswak use was more prevalent among men ($P < 0.01$), while women used toothbrush more than miswak ($P < 0.05$). Regular miswak use was more frequent at older age ($P < 0.001$) and tooth brushing was less prevalent. Forty-four percent of the 51- to 60-year-old patients at the military center never used a toothbrush. Regular toothbrush use was more prevalent in the youngest age groups ($P < 0.001$). Among the 10- to 15-year-olds, 45% at the university center used only a toothbrush, while no adolescents at the military center used only a toothbrush. We conclude that there are large differences in current oral hygiene habits among Saudi Arabians, and that these are related mainly to age and socio-economic level, and to a lesser extent gender. This should be taken into account when planning oral health strategies for different categories.

☐ *Chewing stick; dental; miswak; oral hygiene; toothbrush*

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Toothbrush use is not widespread in developing countries. In the Middle East, the miswak, a traditional chewing stick, is preferred, for religious and cultural reasons. A key question in public dental health is whether strategies to improve oral hygiene should be based on the toothbrush, the miswak, or both. The chewing stick has its origin in antiquity. It was used by the Arabs in the pre-Islamic era to make their teeth white and shiny. However, Islam has had a decisive influence on its widespread adoption (1). In the early Islamic period, the miswak was associated with a cultured, elegant lifestyle. Muslims follow the example of their Prophet, who was a fervent supporter of the miswak, declaring it to be 'cleansing for the mouth and a pleasure for Allah'.

Compared to the chewing stick, the toothbrush is relatively modern. It was introduced in Europe only about 300 years ago (2). Although oral hygiene based on the use of toothbrush and toothpaste is well established and widespread in industrialized countries, in a global context the chewing stick is far from obsolete. Frequent use of miswak has been associated with a lower need for periodontal treatment (3). The World Health Organization (WHO) has recommended and encouraged the use of chewing sticks as an effective tool for oral hygiene (4) and in parts of Asia, Africa, the Middle East, and America, particularly in rural areas, miswak use is common (1, 5–8).

In Saudi Arabia, it is socially acceptable to use a miswak in public. It is the custom for Saudi Arabians to carry one in their pocket, and use it frequently during the day, at work, at home, at the mosque, and in the street.

Several studies have confirmed the widespread use of the miswak in Saudi Arabia. In a study based on a sample of 3117 people, 15 years and older, in 10 regions of Saudi Arabia, 50% were reported to use a miswak (9). Data from a limited sample of individuals from 6 Saudi Arabian regions indicated that 75% of the male and 66% of the female population used a miswak regularly (10).

Middle Eastern countries have undergone rapid development and modernization and young Saudis have spent most of their lives in the oil boom period. In the rapidly changing social and economic environment, regular promotional drives and intensive advertising in the media, frequently targeting the young, have led to modified dietary habits, with increased consumption of refined carbohydrates in for example sweets and soft drinks. These dietary changes have the potential to adversely affect oral health. Traditional dietary habits and practices have continued, but foods and drinks typical of Westernized diets are now cheap and rapidly available, particularly in the major cities (11). Soft drink consumption among young Saudi men far exceeds that of Western populations (12). Major contributing factors are most probably

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climatic differences and differences in public dietary awareness.

Several studies have confirmed poor oral hygiene habits and very frequent sugar intake in Saudi Arabian children (13–15). In a study by Akpata et al. (16), a statistically significant relationship was found between decayed, filled, surfaces (DFS) scores and the frequency of sugar consumption recorded in the dietary diary.

Caries prevalence among Saudi Arabian children and adolescents is high (17–20). A recent 2-year study of 82,250 children in Jeddah aged 7 and 10 years (19) disclosed a clinical caries rate of 83% and a significant association between lower social class and high caries rate. Al-Shammery (18) reported similar caries experience in 12- to 13-year-old urban and rural schoolchildren (mean DMFT: 2.69 and 2.65 in urban and rural areas, respectively) and similar frequency of snacking, consumption of sweets and soft drinks. A study by Alamoudi et al. (17) on 6- to 9-year-olds in the city of Jeddah disclosed only 26.1% to be caries-free. Wyne et al. (20) reported a high prevalence of nursing caries, 27.3%, in preschool children. High caries treatment needs were found among Saudi children, especially in the public schools (21).

The above-cited studies highlight the need for caries preventive measures among Saudi Arabian children and adolescents. Public health preventive programs need to be compatible with the traditions and customs of the target population. A key question in public dental health planning for Saudi Arabia is whether strategies to improve oral hygiene should be based on the toothbrush, the miswak or both.

The aim of this study was to document prevailing oral hygiene practices among Saudi Arabians in relation to age, gender, and socio-economic background.

Materials and methods

Outline of the study

After informed consent was obtained, information about oral hygiene habits was collected by structured interviews of outpatients normally visiting either of two Dental Clinics in the city of Makkah in Saudi Arabia. One dental clinic was situated at the Umm Al-Qura University Medical Center (hereafter referred to as the university center), which is responsible for the primary health care of the university staff and their families. The other dental clinic was situated at the Security Force Medical Center (hereafter referred to as the military center), which is responsible for the primary health care of soldiers and their families. Three dentists conducted the structured interviews: a male dentist at the military center, and a male and a female dentist at the university center. The questionnaires were collected and subsequently mailed to Karolinska Institutet for analysis.

Subjects

At each center, 600 consecutive dental patients aged from 10 to 60 years were enrolled in the study. They were stratified by age into the following 6 categories: 10–15, 16–20, 21–30, 31–40, 41–50, and 51–60 years. At each center, each age category comprised 50 male and 50 female subjects. Information was collected about their oral hygiene habits in relation to age and gender.

Questionnaire

Three staff dentists from the Dental Centers asked the questions and recorded the subject's answers on the questionnaires. Before the start of the study, the interviewers had received oral and written instruction on how to conduct the interviews. They were not aware that part of the study was being conducted at the other center. The questionnaire, constructed and prepared at Karolinska Institutet by one of the authors (M.A.-O.), contained 14 questions for the 2 youngest age groups (10–15 and 16–20 years) and 12 questions for the remaining age groups. The questions were constructed with closed alternative answers in order to be simple and easily understood by the subjects, regardless of educational level, and easily interpreted and recorded by the interviewers. The questionnaire was designed to provide an overall view of the oral hygiene habits of the subjects, with special reference to use of the miswak and/or toothbrush, subject's age at start of use, frequency of use, and the subject's educational level. The additional questions for the 2 youngest age groups included information about the parents' educational levels. The questionnaires were prepared and administered according to age category: 600 forms for each center, and 50 forms per each age and gender category. Each dentist kept the forms of each category in a separate file, and then selected a form from the appropriate age and gender file when the subjects were enrolled. This process was continued until all the forms in any one category had been used. The dentist then closed the file and sent it to one of the authors for analysis. The same procedure was followed at both centers.

About 15% of the consecutive patients invited to participate refused to do so. They were predominantly females.

Statistical analysis

The data were analyzed statistically and presented in a graph and tables. For the evaluation of oral hygiene habits in relation to center, age, and gender, a generalized linear model was applied, where the dependent variable had a binomial distribution and the explanatory variables, center, age, and gender, were categorical. The logit model served as the link function (22).

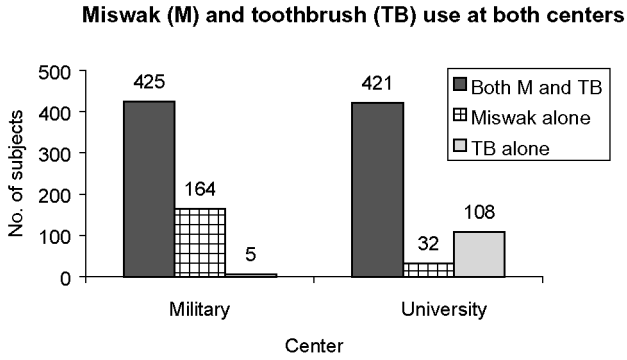

Fig. 1. Distribution of use of the miswak, toothbrush, or both by patients at the two dental centers.

Results

The distribution of users of the miswak, the toothbrush, or both, at the two centers is presented in Fig. 1. At the military center 71.5% used both miswak and toothbrush, 27.6% were solely miswak users, and 0.8% used only a toothbrush. In contrast, at the university center 75.0% used both miswak and toothbrush, 5.7% used the miswak only, and 19.2% were exclusively toothbrush users. About 65% of all individuals used a miswak daily and 73% used a toothbrush daily. Table 1 presents the number of subjects in different age groups at the two dental centers who answered 'yes' and/or 'no' regarding their use of miswak and/or toothbrush. There were major age-related differences. Regular miswak use was more frequent at older age and tooth brushing was less prevalent. There were pronounced differences between the centers. At the military center, 99% of the subjects were miswak users, 89% using it daily, while 72.4% used a toothbrush, but only 59.5% used it daily. At the university center, 91% of the subjects were miswak users, and 37% used it daily, while 98% were toothbrush users, and 87% used it daily.

At the military center there were no significant differences between the age groups regarding the use of miswak, while there were significant differences ($P < 0.001$) in the use of toothbrush between the age group 31–40 years, on the one hand, and the younger ones, and the oldest group, 51–60 years, on the other. Forty-four percent of the 51- to 60-year-old patients at the military center never used a toothbrush. At the university center there were significant differences ($P < 0.001$) in the use of miswak between the youngest age group and all other age groups, and no significant differences between the age groups in the use of toothbrush.

Toothbrush use among individuals under 31 years was similar and prevalent at the 2 centers. With increasing age, the differences between the centers increased ($P < 0.001$). There were significant differences ($P < 0.001$) between the centers in the use of miswak among the youngest individuals.

Table 2 presents the use of the miswak and/or toothbrush in relation to gender among subjects at the military and university centers, respectively. In general, miswak use was more prevalent among men ($P < 0.01$), while women used toothbrush more than miswak ($P < 0.05$). At the university center, more males than females used the miswak. However, there were only significant differences ($P < 0.05$) between genders for the age group 16–20 years. Among females at the university center, there were significant differences in the use of miswak between the youngest (10–15 years) and those over 21 years, while among the males significant differences were found between the youngest and all other age groups. At the military center there were no differences between genders or age groups regarding the use of miswak. The

Table 2. Percentage of male and female patients answering yes and/or no regarding their use of miswak and toothbrush

	Miswak				Toothbrush			
	Male		Female		Male		Female	
	Yes	No	Yes	No	Yes	No	Yes	No
Military Center	99.3	0.7	99	1	69.8	30.2	75	25
University Center	85.5	14.5	75.7	24.3	92.1	7.9	96.7	3.3

Table 1. The number of subjects in different age groups at the two dental centers who answered 'yes' and/or 'no' regarding their use of miswak and/or toothbrush. The varying numbers in different age groups are due to some missing and incomplete data

	Military Center				University Center			
	Miswak		Toothbrush		Miswak		Toothbrush	
Age groups	Yes	No	Yes	No	Yes	No	Yes	No
10–15 years	100	0	98	2	48	51	91	8
16–20 years	100	0	98	2	74	17	85	5
21–30 years	96	2	84	14	92	8	91	9
31–40 years	98	2	69	31	76	10	82	1
41–50 years	96	2	69	29	87	13	88	5
51–60 years	98	0	12	86	88	9	92	4
Total	588	6	430	164	465	108	529	32

use of toothbrush was significantly different ($P < 0.001$) between the oldest, 51–60 years, and all other age groups. The male miswak users at both centers had a higher frequency of use than the females. At the university center, 95% of the female toothbrush users brushed daily.

Discussion

The study was designed to disclose prevailing oral hygiene practices in relation to age and gender in an urban Saudi Arabian population. The subjects were recruited among consecutive patients attending 2 medical centers providing dental care for military and university staff and their families, respectively. There were pronounced differences in socio-economic and educational levels between the clientele of the 2 centers (data not shown).

Makkah is a non-industrial city located about 70 km east of Jeddah in Saudi Arabia, having a population of more than 500,000, which is periodically increased four times by pilgrims or visitors to the Holy City. Most residents of Makkah are involved as private or governmental employees in providing service for the religious visitors.

The average number of regular patients visiting one of the dental centers is more than 8000 per year. The dentists routinely advise the patients to take care of their oral hygiene, but there are no special preventive programs in such dental centers.

About 15% of those invited to participate refused to do so. These were mainly women. Possible reasons for refusal were that the women felt shy or uncomfortable in an unfamiliar situation, or could not spare the time to participate. Despite the refusal rate, the subjects of this study may be regarded as a representative sample of dentally aware urban residents of differing socio-economic and educational levels, but not representative of the whole population of Saudi Arabia.

Oral hygiene practices were strongly correlated with age and also with socio-economic level, as reflected in the significant differences between the two centers. Toothbrush use dominated among the 10- to 15-year-olds at the university center, while at the military center miswak use was prevalent in all age groups and predominated in the 51- to 60-year-olds.

Compared with earlier data from Saudi Arabia (9–10) the results provide a contradictory and more detailed view. While 89% of male subjects and 96% of females in the study by Guile et al. (9) used a toothbrush, this concurs with our data from the university center only. At the military center, only 37% used a toothbrush daily, and 44% of the 51- to 60-year-olds never used a toothbrush.

Almas et al. (10) reported that 75% males and 66% females were regular users of the miswak, which was fewer than was found in our study. We found pronounced differences in oral hygiene habits among the different age groups, and between the two centers, the latter reflecting differences in socio-economic and educational levels.

We found that 99% of the subjects at the military center and about 91% of those at the university center used the miswak, and 89% and 37%, respectively, used it daily. Our study comprised information from a larger sample, and the design of the study enabled analysis of oral hygiene practices in relation to age and gender of individuals with different socio-economic background. At higher socio-economic levels, the prevalence of miswak use was lower among females than among males, while at lower socio-economic levels; the prevalence of miswak use was almost 100% for both genders.

The subjects of the present study lived mainly in the city of Makkah and were accordingly classified as an urban population. In a study of the use of chewing sticks in rural and urban areas in Pakistan, Asadi and Asadi (7) found that more than 50% of rural subjects but only 25% of the urban population used a miswak. The authors attributed these differences to educational levels, awareness of modern methods and materials, and socio-economic status. By contrast, the present study disclosed a much higher prevalence of use of the miswak in the Saudi urban area, 81–99%, which could be attributable to religious tradition among the Saudis.

The correlation between lower educational levels and higher prevalence of miswak use disclosed in the present study has also been reported in other countries (7). However, despite the relatively high socio-economic status of Saudi Arabia, use of the miswak is widespread, as highlighted by its use by about 91% of the patients from the university center. This is again probably attributable to religious tradition in Saudi Arabia.

Prevailing oral hygiene practices were found to be different in different age groups and it is proposed that public health preventive measures should be tailored accordingly. The following general outlines, based on the results of the study, are presented as guidelines for application in urban populations.

Fluoride toothpaste is generally acknowledged as the major factor underlying the dramatic decline in caries in the Western world over the past three decades (23). As most young Saudis already use a toothbrush, promotion of brushing with fluoride toothpaste twice daily should have the highest priority in caries preventive strategies targeting young Saudis.

Hygiene habits conducive to oral health should be established early in life. The staff of maternal and child welfare clinics could promote oral health by recommending that parents brush their children's teeth with fluoride toothpaste twice daily from a very early age.

Changing the oral hygiene habits of the older adult population is a sensitive and more complex issue. It is proposed that older adults should be advised to continue with the method they prefer, either the miswak or the toothbrush. It is important that they are trained to use the device effectively. At the dental schools in Saudi Arabia, the education in preventive measures should also include instruction in an appropriate use of miswak.

This study highlights the need for reliable data related to oral health status and use of the miswak by Saudis as a

basis for tailoring preventive measures appropriate for various target groups in the population.

The collected data are currently undergoing more detailed analysis in order to disclose possible correlations between oral hygiene practices and such factors as the educational level of the subjects, their parents, etc.

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