Oral Hygiene Habits and Oral Health Awareness among Urban Saudi Arabians

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Purpose: To analyze prevailing oral hygiene practices and oral health awareness among urban Saudi Arabians in relation to age, gender and educational level.

Materials and Methods: Structured interviews 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 by gender and age, into 6 categories from 10 to 60 years, with 50 male or female subjects in each group at each center. Oral hygiene habits and attitudes to oral health were correlated with age, gender and educational levels, using ANOVA.

Results: For the majority (> 88%) oral hygiene routines were introduced very late, after the age of 7 yr. Habits were strongly correlated to the level of education ($p < 0.001$); subjects with less education favored the miswak. Among the better educated, toothbrushing started earlier ($p < 0.001$). Regular miswak use was more frequent in older age groups ($p < 0.001$). Females used a toothbrush more often than males ($p < 0.001$), and miswak use by women was less frequent than by men ($p < 0.001$). Despite the availability of free dental care at the public health centers, 89% of the participants at the military center sought only emergency care, in contrast to 54% at the university center.

Conclusions: Among urban Saudi Arabians, oral hygiene routines are introduced relatively late in life and knowledge and awareness of oral health is very low. There are pronounced variations in oral hygiene habits, related mainly to age and educational levels. Such factors should be taken into account when planning oral health strategies.

Key words: chewing stick, dental, education, oral hygiene, practice

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Nowadays, cleaning teeth with manufactured toothbrushes is common in most industrialized countries, whereas in many third-world countries toothbrushes are still uncommon. Instead, chewing sticks, made from local material such as trees and shrubs are commonly used (Hardie and Ahmed, 1995). The name also varies in different parts of the world (Elvin-Lewis et al, 1980; Hollist, 1981; Hattab, 1997; Wu et al, 2001).

In Saudi Arabia today there are large variations in oral hygiene habits, related mainly to age and socio-economic levels (Al-Otaibi et al, 2003). The chewing stick, or miswak, is commonly used as a traditional and spiritual custom (Guile et al, 1996; Almas et al, 2000; Al-Otaibi et al, 2003) and is carefully selected for certain characteristics such as size, hardness, and taste. The plant most commonly used for miswak manufacture is Salvadora Persica and this type is called Arak, prepared from the root of the plant.

Events in early childhood may be important determinants of future dental health. During this period the primary teeth erupt, bacteria colonize the teeth and dental behavior is established (Tap-

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puni and Challacombe, 1993; Rossow et al, 1990; Jones et al, 1996). During adolescence, young people assume responsibility for learning and maintaining health-related attitudes and behaviors that persist into adulthood. It has been shown that relatively stable patterns of tooth brushing, physical activity, smoking and dietary behavior are established during childhood and adolescence (Kuusela et al, 1997; Kelder et al, 1994). There is a need for dentists as well as other primary health care providers to become actively involved in the promotion of behavior which enhances oral health among children and young adolescents (Honkala et al, 2002). Within the context of education and health, the school, in addition to the family, plays an important role in the individual's development, because many children spend most of the day at school and this is an environment in which they develop important health and behavioral habits.

Based on the limited information available on oral health in the Kingdom of Saudi Arabia (Al-Shammary et al, 1990; Al-Khateeb et al, 1991; Alamoudi et al, 1996; Al-Banyan et al, 2000), it is clear that there is an urgent need for caries preventive measures among Saudi Arabian children and adolescents. Compared with their peers in developed countries, Saudi pre-school children have high scores for the mean number of decayed, missing and filled teeth and for caries prevalence (Wyne et al, 2002). A major decay component indicates a high percentage of untreated caries and the high percentage of carious maxillary incisors indicates a pattern of nursing caries (Wyne et al, 2002).

A recent study among primary and secondary school teachers in Saudi Arabia showed that there is a need to improve their knowledge of oral health and disease. Both categories need to become more aware of oral health promotion, in order to play an active role, in collaboration with oral health care workers, in school oral health education of their pupils (Almas et al, 2003). In order to be effective, public health preventive programs need to be compatible with the traditions and customs of the target population. With respect to oral health, the close association with religious tradition suggests that use of the miswak will continue to be important in oral hygiene routines among Saudi Arabians. However, variations in oral hygiene habits related to age, gender and educational levels also need to be analyzed and taken into account in planning strategies to improve the oral health of the Saudi population.

The present study continues the investigation of the material presented by Al-Otaibi et al (2003). The aim was to document and evaluate prevailing oral hygiene practices and awareness of oral health in a sample of urban Saudi Arabians in relation to age, gender and educational levels.

MATERIAL AND METHODS

Outline of the Study

The study was approved by the Ethics Committee at Huddinge University Hospital, Sweden, and by the administration of the Medical Center of Umm Al-Qura University and the Security Force Medical Center in Makkah City. After informed consent, information about oral hygiene habits was collected by structured interviews of outpatients attending one 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 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 yr. At each center, each age category comprised 50 male and 50 female subjects.

Questionnaire

Three staff dentists from the dental centers asked the questions and recorded the subject's answers on the questionnaires. Before the study start the interviewers had received oral and written instruction in how to conduct the interviews. The question-

naire was constructed and prepared at Karolinska Institutet by one of the authors (M.A-O.). The questionnaire contained 14 questions for the youngest two age groups (10 – 15 yr and 16 – 20 yr) and 12 questions for the remaining age groups. In order to be simple and easily understood by the individuals, regardless of educational level, and easily interpreted and recorded by the interviewers, the questions were constructed with closed alternative answers. The questionnaire was designed to provide an overall view of the oral hygiene habits of the subjects, with special reference to the use of the miswak and/or toothbrush, individual's age at start of use, frequency of use and the individual's educational level. The additional questions for the youngest two 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 for each category in a separate file, and then selected a form from the appropriate age and gender file when the individuals 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, predominantly females, declined the invitation to participate.

Statistical Analysis

The data were analyzed statistically and presented in tables and graphs of the means, medians and standard errors. For evaluation of oral hygiene habits in relation to center, age, gender and educational level, ANOVA and a generalized linear model were applied, where the dependent variable had a binomial distribution and explanatory variables, center, age, gender and educational levels were categorical. The logic model served as the link function (McCulagh and Nelder, 1989).

RESULTS

The distribution of miswak and/or toothbrush use in the sample is illustrated in Table 1. The distribution based on educational levels and related to gender and center is presented in Table 2. At the university center, the educational levels of the parents of the youngest two age categories were higher than that at the military center (Figs 1 and 2). Similarly, the educational levels of the individuals among the other age groups were higher at the university center than at the military center.

Table 1 Distribution of use of miswak, toothbrush or both by individuals at the two medical centers

	Miswak only No.	Toothbrush only No.	Both M and TB No.
Military Center	164	5	425
University Center	32	108	421
Total	196	113	846

As shown in Figs 3 and 4, oral hygiene habits were strongly correlated to the level of education ($p < 0.001$). The frequency of toothbrushing was also strongly correlated with educational level: the more highly educated the person, the more frequent the toothbrushing. Those with less education favored the miswak. As shown in Fig 5, regular toothbrushing was more frequent in the youngest two groups ($p < 0.001$) and regular miswak use was more frequent in older age groups ($p < 0.001$), as shown in Fig 6. Females used a toothbrush more often than males ($p < 0.001$), and miswak use by women was less frequent than by men ($p < 0.001$) as demonstrated in Figs 7 and 8.

Oral hygiene routines are introduced relatively late among the Saudi Arabians: after the age of 7 yr for the majority (> 88%) of the individuals (Figs 9 and 10). Among those at the military center, miswak use started much earlier than at the university center, while at the university center, toothbrushing started earlier than at the military center. When related to the educational levels, it was found that individuals at the university center started to brush their teeth with toothbrush earlier than with miswak, except for the uneducated, where miswak use started earlier than toothbrushing. In contrast, the individuals at the military center started to use a miswak earlier than a toothbrush, except for the more highly educated, who started using a toothbrush earlier than a miswak. Toothbrushing started earlier among the better educated ($p < 0.001$).

Table 2 Distribution of the study population based on the differences in educational levels between the two dental centers, and related to gender

Level of education	Military Center				University Center			
	female		male		female		male	
	No.	%	No.	%	No.	%	No.	%
Low education	62	20.9	53	17.8	29	10.6	3	1.0
Middle education	153	51.7	147	49.3	92	33.6	84	28.3
High education	81	27.4	98	32.9	153	55.8	210	70.7
Total	296	100	298	100	274	100	297	100

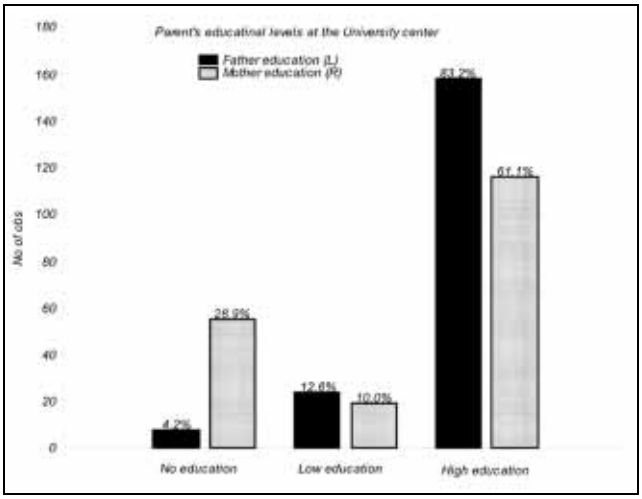

Fig 1 Parents' educational levels at the university center. *Low education* indicates those with primary and intermediate school education (< 9 years of schooling), while *high education* indicates those with high school and university education (> 9 years of schooling).

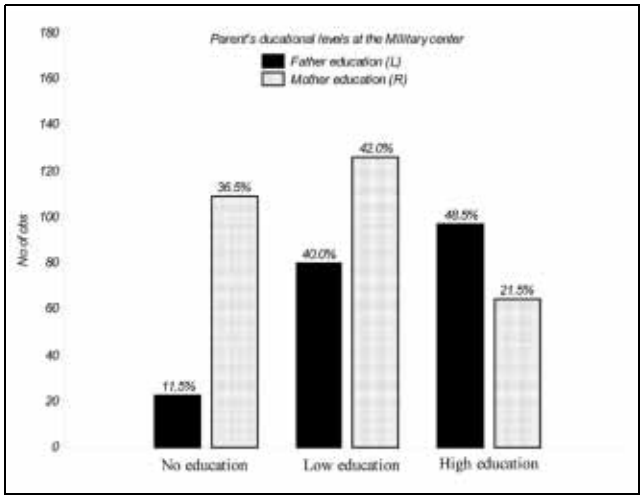

Fig 2 Parents' educational level at the military center. *Low education* indicates those with primary and intermediate school education (< 9 years of schooling), while *high education* indicates those with high school and university education (> 9 years of schooling).

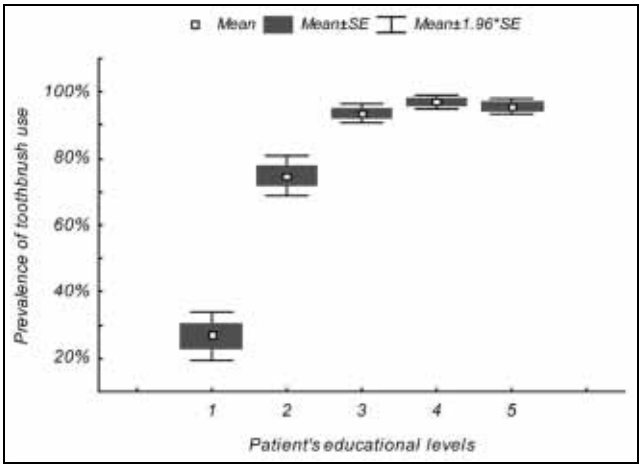

Fig 3 Prevalence (means and standard errors) of toothbrush use among all subjects in relation to their educational levels (1 = no education, 2 = primary school (6 years), 3 = intermediate school (9 years), 4 = high school (12 years), 5 = university (> 12years).

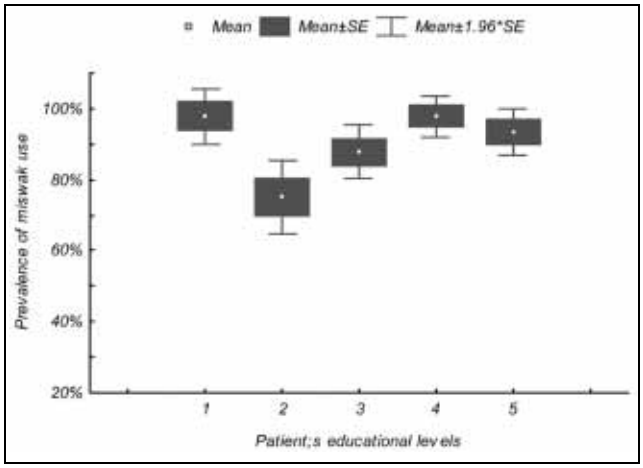

Fig 4 Prevalence (mean and standard errors) of miswak use among subjects in relation to their educational levels (1 = no education, 2 = primary school (6 years), 3 = intermediate school (9 years), 4 = high school (12 years), 5 = university (> 12years).

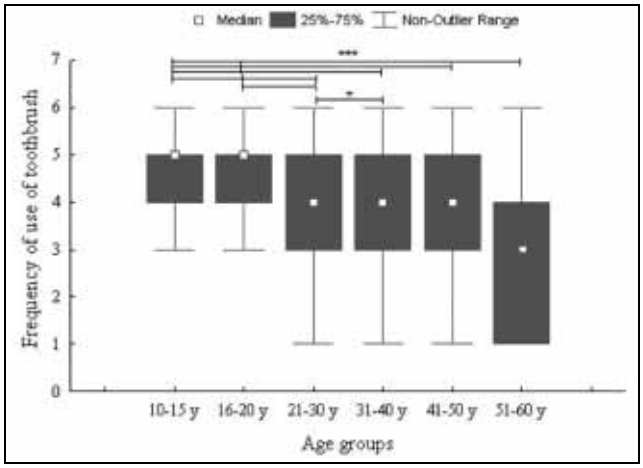

Fig 5 Frequency (median, 25–75%, non-outlier range) of toothbrushing among subjects in relation to their age (1 = never, 2 = sometimes but not every month, 3 = weekly, 4 = daily, 5 = twice a day, 6 > twice daily). (*** $p < 0.001$ and *$p < 0.05$)

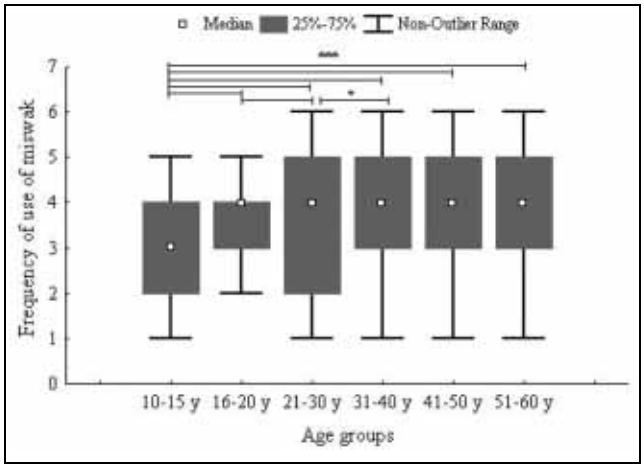

Fig 6 Frequency (median, 25–75%, non-outlier range) of miswak use among subjects in relation to their age (1 = never, 2 = sometimes but not every month, 3 = weekly, 4 = daily, 5 = 5 times a day, 6 > 5 times a day). (*** $p < 0.001$ and *$p < 0.05$)

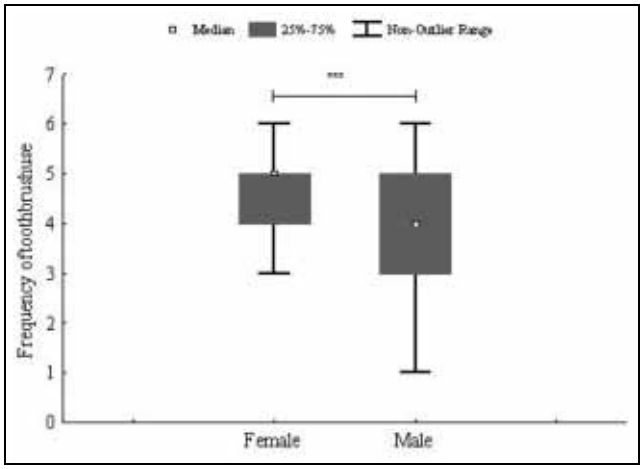

Fig 7 Frequency of toothbrush use (median, 25–75%, non-outlier range) in relation to gender among all subjects (1 = never, 2 = sometimes but not every month, 3 = weekly, 4 = daily, 5 = twice a day, 6 > twice daily). (*** $p < 0.001$)

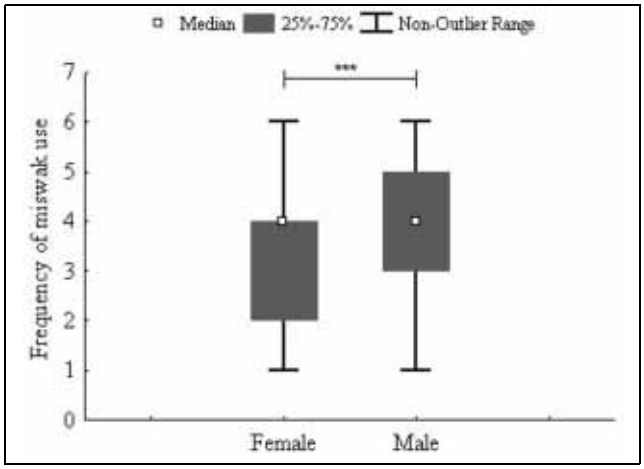

Fig 8 Frequency of miswak use (median, 25–75%, non-outlier range) in relation to gender among all subjects (1 = never, 2 = sometimes but not every month, 3 = weekly, 4 = daily, 5 = 5 times a day, 6 > 5 times a day). (*** $p < 0.001$)

Of the participants at the military center, 89% sought only emergency care, in contrast to 54% at the university center (Table 3). At the university center, the patients sought regular check ups more frequently than those at the military center: 46% at the university center visited the dentist once a year or every second year, compared to only 11% of those at the military center.

Table 4 illustrates the reasons given for miswak use by the study population. It was found that 7% and 11% of the miswak users at the military and university center, regarded it merely as an oral hygiene aid. About 65% of the miswak users at the military center regarded it only as a religious custom, compared to 15% at the university center. However, at the military center about 28% of the miswak users regarded its use as both an oral hygiene aid and a religious custom, in contrast to 74% at the university center.

DISCUSSION

A strong correlation has been found between oral hygiene habits and the prevalence of caries (Stew-

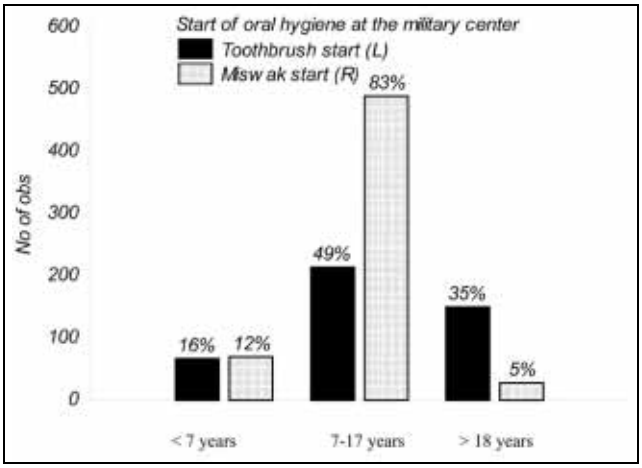

Fig 9 Age at introduction of oral hygiene among subjects at the military center.

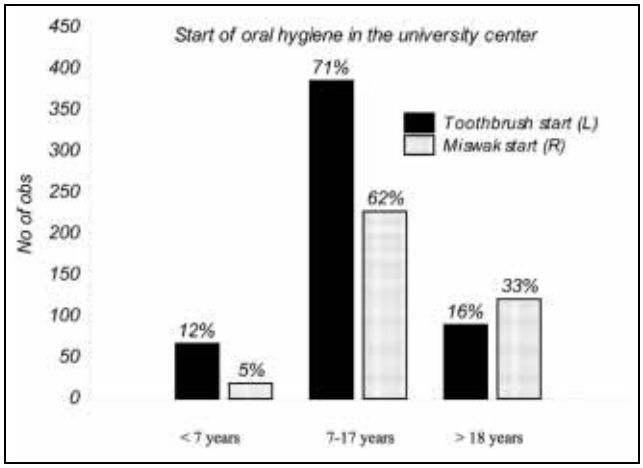

Fig 10 Age at introduction of oral hygiene among individuals at the university center.

Table 3 Frequency of dental visits at the military and the university centers

Dental visit	Military Center		University Center	
	No.	%	No.	%
Once/year	16	2.7	154	27.0
Once/2 years	47	7.9	108	19.0
Emergency	531	89.4	307	54.0

Table 4 Reasons given for use of the miswak

	Military Center		University Center		P value
	No.	%	No.	%	
Hygiene only	44	7.5	48	11.4	NS
Religious only	380	64.5	63	14.9	< 0.001
Both	165	28	311	73.7	< 0.001

art and Stamm, 1991; Dominguez-Rojas et al, 1993; Leverett et al, 1993; Bolin et al, 1997; Al-Ghanim et al, 1998). The oral and dental health benefits of toothbrushing with toothpaste are well recognized (Fleming, 2003) and a low incidence of periodontal disease in Saudi school children is attributed to use of the miswak (Guile et al, 1988).

Thus, the use of the miswak may be one of the factors accounting for the low prevalence of dental caries in developing countries where this habit still persists. With industrialization, the chewing stick habit is decreasing, more so in urban than rural areas. The incidence of caries is also increasing (Chawla, 1983). This has been attributed to increased availability and greater frequency of sugary snacks and drinks and inadequate oral hygiene (Al-Banyan et al, 2000). In the year 2000 Consensus Statement on Oral Hygiene by the World Health Organization (WHO, 2000), arguments were presented in support of the use of chewing sticks to help in the promotion and maintenance of oral hygiene.

The present study documented current oral hygiene habits and oral health awareness among urban Saudi Arabians in relation to age, gender and education. The data were collected by means of interview-administered questionnaires and due to the consecutive participation approach, the response rate was high. However, the data collection method may have certain limitations, because the participants may tend to give socially desirable responses by overestimating the frequency of miswak use and tooth brushing. The patients attending the two dental centers represented different levels of educational background in an urban population. The study population was not a random sample of the Saudi Arabian population and the findings should not be extrapolated to the whole Saudi Arabian population. Oral hygiene practices were strongly correlated to the level of education: the

higher the level of education, the greater the frequency of toothbrushing. These findings are in accordance with those of Almas et al (2000) and Al-Hosani and Rugg-Gunn (1998). The present study also disclosed that females used a toothbrush more often than males, and miswak use by women was less frequent than by men. This is in agreement with the results of other studies (Al-Shammery, 1999; Almas et al, 2000).

The present study disclosed that for most of the individuals (> 88%) oral hygiene routines were not introduced until after the age of 7 yr. This late introduction of oral hygiene routines in Saudi Arabia could be reflected in the widespread oral disease in childhood and adolescence. In order to explore their attitudes towards oral health, the participants were asked when they last visited a dentist. Despite the availability of free dental care at the public health centers, 89% of the participants at the military center sought only emergency care, in contrast to 54% at the university center. This might be attributable to lack of awareness or interest in oral health among the participants or dissatisfaction with the free dental services. In general, oral health awareness seemed to be very limited in our study population. However, dental attendance habits might be influenced by educational and cultural factors.

Most of the participants associated use of the miswak with both religious tradition and custom and with oral hygiene. The close association with religious tradition indicates that use of the miswak will continue to be important in oral hygiene routines among Saudi Arabians and other Muslim communities.

The pronounced variations found in oral hygiene habits related to age, gender and educational levels among the urban Saudi Arabians in our study are of importance for planning oral health strategies. Oral hygiene routines should be established much earlier and awareness of oral health needs greater promotion. In Saudi Arabia, it would be appropriate to preserve established oral hygiene traditions and complement these with a modern approach – toothbrushing with fluoride toothpaste, especially among younger Saudis. However, in this context it should be acknowledged that the elderly are usually very bound by tradition and unwilling to change their established behavior.

It is generally agreed that since the 1960 s and '70 s, a reduction in dental caries prevalence has occurred in most westernized countries. During the decades of caries decline, various measures were used to control the disease in the developed world (Bratthall et al, 1996), and the experience of those countries which have succeeded in raising the oral health standard of their populations may serve as a guide for oral health promotion in developing countries.

In Saudi Arabia, further, more extensive studies are needed in order to establish a reliable database on oral health status. Data for target groups in the population should be analyzed thoroughly, in order to provide a basis for planning appropriately tailored preventive measures for each group.

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