











Tobacco Smoking, Secondhand Smoke Exposure and Cessation Perceptions by Dental Students in Al Madinah, a Conservative Saudi Society

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ABSTRACT

Objective: To explore the prevalence of tobacco use and secondhand smoke (SHS) exposure in dental students and to investigate their perceptions on the role of dentists in tobacco cessation activities. **Material and Methods:** A questionnaire-based study was conducted in a public university in Al Madinah, Saudi Arabia. The questionnaire investigated demographic factors, tobacco use practices, SHS exposure, and student perceptions of tobacco cessation activities. Descriptive statistics and statistical significance of differences between demographic groups were calculated. **Results:** A total of 228 students participated with 43.0% (n=98) males and 57.0% (n=130) females. A proportion of 30.7% (n=70) of the participants smoked tobacco, and these constituted 51 males (73%) and 19 females (27%). Only 39 students (15 females and 24 males) indicated their method of tobacco use, which was mainly cigarettes and waterpipes. One in two students was exposed to SHS. Non-smokers had better awareness of the health hazards of SHS ($p < 0.001$), and were more likely to adopt tobacco cessation activities recommended by dentists ($p < 0.05$). **Conclusion:** A substantial proportion of dental students in a very conservative religious area smoke tobacco and are exposed to SHS. Their perceptions of the harms of SHS and attitudes on cessation need improvement. The influence of culture and religion in shaping health risk behaviors in conservative communities needs to be verified.

Keywords: Students, Dental; Water Pipe Smoking; Tobacco Use Cessation.

Introduction

Tobacco use is associated with several adverse health outcomes in cancer, respiratory, and cardiovascular diseases, among many others [1]. Moreover, the demographics and attributes of this habit have changed across the globe with a noticeable resurgence of old habits such as waterpipe smoking and the emergence of new habits such as smoking e-cigarettes [2]. On the other hand, exposure to secondhand smoke (SHS) represents another serious public health threat, being linked to heart disease, lung cancer, and asthma in children [3,4]. SHS can be described as environmental tobacco smoke, composed of mainstream smoke exhaled by smokers and sidestream smoke arising from burning tobacco products [5].

It is estimated that 80% of current smokers live in low and middle-income countries [6], with a rapidly growing prevalence of smoking in the age group 15-24 years [7]. As the numbers of smoking youth increase, particularly in developing countries, it is important to understand the continuing roles of cultural and religious influences on tobacco cessation activities.

Islam is the religion practiced by most Arabs. It has dominant spiritual and legal influences on societal behavior in reducing harm directed to self and others [8]. For example, tobacco use was initially considered a lawful activity by early Muslim scholars because its harms were not clearly understood at the time. However, smoking was later prohibited based on the Islamic law that generally prohibits any practice that results in harm to self or others through, for example, exposure to SHS [8]. Cultural and religious factors are likely to be more influential in conservative societies such as those in Al Madinah, the second most holy city in Islam next to Makka. Al Madinah is also considered one of the most conservative societies in the Middle East, and its population continues to maintain characteristic cultural attitudes and social morals based on Islamic teachings.

In addition to the roles of religion and culture, healthcare professionals (current and future) such as dental practitioners also play pivotal roles in combatting tobacco use in their patients, for example, by supporting tobacco cessation efforts by their patients [9]. Moreover, dental professionals frequently identify adverse oral health effects of tobacco, such as oral cancer, potentially malignant lesions and periodontal disease [10]. However, the participation of dental practitioners in tobacco cessation practices can be jeopardized by several factors, including their personal use of tobacco products [9], since smoker dentists are less willing to engage in tobacco cessation efforts [10]. Dental students are the future generation of dental practitioners. Awareness of health hazards and willingness to adopt tobacco cessation activities should start early in their careers. The World Health Federation (FDI) has recommended engagement of dental students in tobacco cessation activities as they are expected to be highly keen to assume their future career duties [11]. Therefore, it is important to obtain information about their behavior and attitudes toward tobacco smoking. Further, it is important to understand the potential influence of other important confounders such as culture and religion in shaping health risk behaviors, namely tobacco use.

The Arab peninsula has undergone many changes in tobacco use, including an increased prevalence (especially among females) and the introduction of newer forms of tobacco use [2]. Consequently, the World Health Organization (WHO) recommended several policies for protection against the harms of tobacco use, including recommendations for healthcare professionals in combatting the tobacco epidemic [12].

Data on tobacco use practices and SHS exposure in dental students, especially in conservative societies of the Middle East, are scarce. This study was conducted among university dental students in Al Madinah province: to investigate the prevalence of tobacco smoking and SHS exposure; to assess their awareness on health hazards SHS and; and finally, to explore their perceptions on their role in tobacco prevention and cessation.

Material and Methods

Study Design and Sample

A cross-sectional study was conducted using an electronically self-administered questionnaire. The questionnaire was entered in Google Forms and distributed to all current dental students enrolled in the College of Dentistry, Taibah University, Al Madinah, Saudi Arabia. The undergraduate degree in dentistry offered is a 5-year program and students from all years of the program were invited to participate in the study.

Sample size determination was carried out using the epidemiological software Epi Info™ (CDC, Centers for Disease Control, Atlanta, USA) and utilizing the following values: population size of 400 (total number of current dental students), expected frequency of smoking of 25.0%, acceptable margin of error (MOE) of 5.0%, and design effect was set at one with one cluster. A power of study of 99% required a sample size of 221 students.

Inclusion criteria were: all male and female students in the Bachelors of Dental Surgery program at Taibah University who consent to participation, including smokers and non-smokers. Exclusion criteria were students who did not give their consent. The questionnaire explained the aim of the study, the researcher's affiliation, and contact information.

Data Collection

The questionnaire was based on a survey conducted previously [13]. It was composed of 4 sections having 19 closed-ended questions. The first two sections contained multiple choice questions, while the remaining two sections required responses on a 5-point Likert scale (Strongly Agree = 5; Agree = 4; Neutral = 3; Disagree = 2; and Strongly Disagree = 1). The first section related to demographic characteristics (age, gender, marital status, and residence); the second section included general questions on smoking frequency, the main sources of exposure to passive smoking; the third section related to the acceptability of passive smoking exposure, and the fourth section covered knowledge of health risks related to exposure to passive smoking and attitudes on tobacco control programs. Distribution of the questionnaire was performed during March-May 2018.

Data Analysis

Data were coded and analyzed using IBM SPSS software for Windows (SPSS version 21 software, Armonk, NY: IBM Corp). Descriptive statistics were conducted to indicate frequencies and percentages. Total scores were calculated, Spearman correlation was calculated and chi-square test was used to estimate statistical differences between groups. A p-value of less than 0.05 ($p < 0.05$) was considered statistically significant.

Ethical Clearance

The research was conducted in complete accordance with the principles of the World Medical Association Declaration of Helsinki. Ethical approval was obtained from Taibah University College of Dentistry Ethical research committee (#TUCDREC/20180125/Karbouji). Consent of participants was obtained prior to participation. Further, the voluntary and anonymous nature of participation was stated clearly before commencing to enter the responses.

Results

A total of 400 dental students were invited to participate, with a response rate of 58.0%. A proportion of (43.0%) of the sample were males and (57.0%) were females. The marital status of students was: single

(88.6%), married (10.5%), and divorced (0.9%). Most students lived with family (92.1%), and a minority lived elsewhere (7.9%).

The smoking prevalence in the study group was 30.7%. The prevalence of self-reported smoking status according to age, gender, marital status, residency, and academic year is summarized in Table 1. Significantly more males were smokers ($p < 0.001$); however, there was no statically significant difference between groups of age, marital status, residency and academic year ($p > 0.05$) (Table 1).

Table 1. Tobacco smoking prevalence and statistical significance of difference among demographic groups of gender, age, marital status, residence and academic year.

Variables	Smokers	Non-smokers	Total N	p-value	Spearman Correlation R	95% CI		p-value#
	N (%)	N (%)				Lower Bound	Upper Bound	
Gender								
Female	19 (14.6)	111 (85.4)	130	<0.001	-0.402	-0.512	-0.284	<0.001
Male	51 (52.0)	47 (48.0)	98					
Age (Years)								
18-21	12 (32.4)	25 (67.6)	37	0.803	0.017	-0.115	0.148	0.804
22-29	58 (30.4)	133 (69.6)	191					
Marital Status								
Married/Divorced	4 (15.4)	22 (84.6)	26	0.072	-0.120	-0.216	-0.015	0.070
Single	66 (32.7)	136 (67.3)	202					
Residency								
Family	64 (30.5)	146 (69.5)	210	0.801	-0.017	-0.161	0.105	0.802
Outside Family Home	6 (33.3)	12 (66.7)	18					
Academic Year								
1st Dental Year	5 (50.0)	5 (50.0)	10	0.801	0.073	-0.055	0.201	0.273
2nd Dental Year	6 (33.3)	12 (66.7)	18					
3rd Dental Year	6 (22.2)	21 (77.8)	27					
4th Dental Year	32 (35.6)	58 (64.4)	90					
5th Dental Year	21 (25.3)	62 (74.7)	83					

CI: Confidence Interval; #p-value for Correlation.

Only 39 students (15 females and 24 males) indicated their smoking methods of tobacco use (Figure 1). The quantity of tobacco consumed by study participants varied by use of cigarettes (1-20 per day), waterpipe (1-21 per week), Midwakh (1-10 per day). Only two males and four females reported multiple methods of tobacco use.

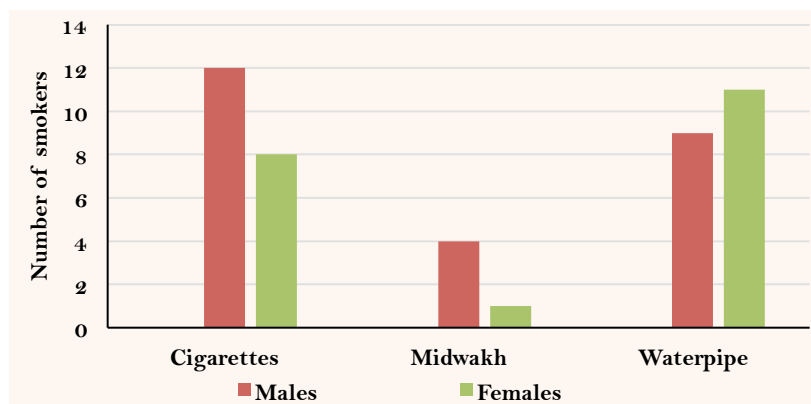


Figure 1. Methods of tobacco use among genders.

The distribution of subjects confirming exposure to SHS according to age, gender and place of exposure is shown in Table 2. Home environment and outdoor locations were the most commonly reported

areas for SHS exposure, where the latter was mainly transport vehicles, college premises, and other areas. Significantly more males were exposed to SHS in all outdoors settings ($p < 0.01$).

Table 2. Percentage of students exposed to SHS in different places and statistical significance of differences among genders.

Place of Exposure	Males	Females	p-value*	Spearman Correlation R	95% CI	p-value for Correlation
	%	%				
Home						
Yes	53.1	45.4	0.251	-0.076	-0.205-0.054	0.253
No	46.9	54.6				
Outdoors						
Yes	64.3	32.3	<0.001	0.318	0.183-0.438	<0.001
No	35.7	67.7				
Transport						
Yes	67.3	33.8	<0.001	0.332	0.205-0.446	<0.001
No	32.7	66.2				
College Premises						
Yes	44.9	26.2	0.003	0.264	0.146-0.390	<0.001
No	55.1	73.8				
Others						
Yes	28.6	8.5	<0.001	0.196	0.063-0.314	0.003
No	71.4	91.5				

*Chi-Square test; CI: Confidence Interval.

Significantly more non-smokers were aware of the health hazards of SHS. There were differences between smoking and non-smoking participants on the relationship between SHS and lung disease in children or lung cancer in adults ($p < 0.001$) (Table 3).

Significantly more non-smokers considered that dentists should routinely give advice on quitting smoking and that dentists can positively impact cessation efforts ($p < 0.05$) (Table 3). However, smokers and non-smokers were nearly equally divided on the likelihood of smoking dentists providing quitting advice to their patients ($p > 0.05$).

Table 3. Knowledge on health hazards of SHS and perceptions on the role of dentist in tobacco cessation among smokers and non-smokers.

Knowledge/Perceptions	Smokers	Non-smokers	p-value	Spearman Correlation R	95% CI	p-value for Correlation
	%	%				
SHS causes heart diseases in adults						
Yes	68.6	61.4	0.299	-0.069	-0.192-0.060	0.301
No	31.4	38.6				
SHS causes lung disease in children						
Yes	55.7	82.3	<0.001	0.280	0.136-0.410	<0.001
No	44.3	17.7				
SHS causes lung cancer in adults						
Yes	47.1	72.8	<0.001	0.248	0.109-0.375	<0.001
No	52.9	27.2				
Dentists should receive training in tobacco cessation practices						
Yes	40.0	65.2	<0.001	0.235	0.095-0.360	<0.001
No	60.0	34.8				
Dentists should have a role in tobacco cessation efforts						
Yes	42.9	67.1	0.001	0.228	0.103-0.358	0.001

No	57.1	32.9				
Dentists should be role models for their patients						
Yes	47.1	62.0	0.036	0.139	0.009-0.259	0.036
No	52.9	38.0				
Dentists should routinely give quitting advice to their patients						
Yes	47.1	72.2	<0.001	0.241	0.107-0.369	<0.001
No	52.9	27.8				
Dentists can impact tobacco cessation efforts						
Yes	55.7	72.2	0.015	0.115	-0.011-0.253	0.082
No	44.3	27.8				
Dentists who smoke are less likely to give cessation advice						
Yes	55.7	54.4	0.857	-0.012	-0.137-0.116	0.858
No	44.3	45.6				

Discussion

There are increased calls for anti-smoking awareness by healthcare professionals, with a greater need for their involvement in tobacco cessation activities. This study was conducted among dental students as they are expected to be part of the healthcare team involved in combating the health risks of tobacco use [9]. Importantly, our study was undertaken in a highly conservative and particularly religious population to explore the potential influence of culture on adverse social habits such as tobacco smoking. Being the second holiest city in Islam, Al Madina is known for its tranquil, peaceful atmosphere that is reflected by the behaviors and attitudes of its citizens. However, an unexpectedly relatively higher smoking prevalence (30.7%) was noticed in the dental students surveyed in this study than their peers in many other countries, particularly in the region. This rate is higher than the prevalence reported in dental students in other areas of Saudi Arabia [14] and also higher than smoking prevalence in dental students in Tunisia, India, Japan, Brazil and the UK were less than 20% of dental students were smokers [15-19]. Smoking rates were almost three times higher in males, similar to other studies of gender difference in smoking rates [20-22]. There is a possibility that smoking rates in females may be under-reported due to social taboos, although a previous study conducted on female students from different study fields in the same university reported a smoking prevalence of ~ 10% [23]. The higher prevalence in this study is alarming as dental students are expected to have greater knowledge of the adverse health effects of smoking.

Students in the study used three methods of tobacco smoking, including cigarettes, waterpipe, and midwakh. The finding of male preference for cigarettes and female preference for waterpipe confirms findings from other studies conducted nationally and internationally. Studies from Saudi Arabia report that cigarette smoking by young Saudi women increased from approximately 5% in the late 1990s to 14% in the early 2000s, and mainly occurred in modernized areas of the Kingdom, not in conservative areas such as Al Madina [24]. There is regional and age-related variability in female smokers in Saudi Arabia, in addition to under-reporting likelihood [25].

The preference for waterpipe smoking by females noted in our study is usually attributed to pleasure, curiosity, independence and freedom to make own life decisions. The lax family and social attitudes toward waterpipe smoking (in contrast to cigarette smoking) have encouraged females to practice the habit in public without being judged or blamed. The passive role of society that shows acceptance to females smoking waterpipe seems to override religious beliefs in Arab nations, especially in a culturally distinct area such as Al

Madina. On the other hand, cigarette smoking by females is considered an inappropriate and impolite behavior that can tarnish their reputation or even jeopardize opportunities of a marriage proposal in conservative Arabic societies [26]. Consequently, cigarette smoking is practiced in secret, particularly by unmarried girls. However, it is not uncommon to see females (whether single or married) practicing the habit of waterpipe smoking in the open without feeling embarrassed or ashamed. Another factor that greatly increased waterpipe popularity among females in recent years is the use of flavored tobacco mixes. Waterpipe coffee shops are common inside and outside the Middle East, but are designated only for men in the Al Madina area, meaning that females can only practice the habit in other areas such as farms and at home.

An interesting finding was that a number of smokers used midwakh (Arabic pipe) or dokha (the Arabic term for “dizzy”), which is a narrow pipe used to smoke a mixture of dried tobacco leaves, herbs, and spices. The main types of dokha blends commonly available are categorized according to the concentration of nicotine in the mix and, consequently, the degree of dizziness produced. Hence, mixes could be cold (light), warm (medium) and hot (strong). About half a gram of dokha blend is placed in the midwakh, and the smoker takes one or two deep inhalations to burn the dokha. Smoking will consequently lead to nicotine-associated brain hypoxia and dizziness. The popularity of midwakh as an alternative to cigarettes and waterpipe smoking is probably due to this feeling of intense dizziness. The habit is promoted by social media, describing it as being odorless, associated with rapid satisfaction of nicotine cravings, production of less SHS, relatively lower cost and more convenient use than the more complicated instrument of the waterpipe [27]. Midwakh has a high nicotine content and is associated with numerous pathologic effects. The immediate effects include increased systolic blood pressure, tachycardia and tachypnea [28]. Long-term use of midwakh leads to sympathetic stimulation of the heart and damage to blood vessels. Seizures and adverse respiratory effects can also occur [27]. The smoke generated by midwakh contains harmful amounts of toxic metals such as cobalt, cadmium, chromium, and lead, as well as irritants, toxic organic compounds, carcinogens, central nervous system depressants, among others [29]. Although most midwakh smokers in this study used midwakh once daily, one student used it ten times per day, highlighting the addictive nature of this type of smoking. Young smokers who use midwakh cite many reasons for its use, including stress management, better concentration, improved mood, and peer pressure [30].

This study is the first to report on midwakh use in Saudi Arabia, as most data on its use is from the Arab Emirates from which the midwakh is thought to originate. A study by Afifi et al. [31] reported the use of midwakh by students in Lebanon and warned of the possible spread of this type of smoking to other Arab populations. About 30% of male and 5% of female medical students in the Emirates are midwakh users [32]. A lower prevalence was reported from Lebanon where 4.6% of students were midwakh users, with an estimated 6.7% use in males and 2.7% use in females [31].

Our study reports a high prevalence of exposure to SHS. Males were exposed to SHS mainly in outdoor settings (transportation followed by home), while females were mainly exposed to SHS in indoor settings (home followed by transportation). A previous study revealed that dental students were less aware of the health risks of tobacco use and of the potential of SHS to reduce lifespan and cause lung cancer in non-smokers [33]. A study by Warren et al. reported that dental students were exposed to SHS in public spaces in 37 of 48 countries [13]. Saudi Arabia is experiencing changes in the trends of tobacco use and, consequently, SHS patterns and risks. A recent study revealed that as many as 96% of dental students were unprotected from SHS in Saudi Arabia [34].

Gender and smoking status in the home and near buildings of the College of Dentistry mostly contributed to exposure to SHS. Male Smokers were more likely than non-smokers to be exposed to SHS on campus, which may explain the high prevalence of smoking in male dental students. Having smoker friends and colleagues can cause a 5-fold increase in the rate of smoking in healthcare students [35]. Women were more likely to be exposed to SHS at home. There was a statistically significant association between the prevalence of SHS exposure and the following variables: smoking status; and having a smoker at home. Our findings are in accordance with other studies of university students where exposure to SHS at home was greater in females [33,36].

The prevalence of smoking coupled with a permissive view of SHS reported in this study are serious because of the potential health advocacy roles by dental students. More than 50% of the students thought that dentists should be trained in smoking cessation. Nearly 80% of medical students in the Global Health Professions Student Survey recognized that they are role models for their patients. More than 50% of students agree that they should be trained in counseling their patients to quit smoking [13].

Non-smokers were more aware of the role of dentists in tobacco cessation activities; however, they were comparable to smokers in acknowledging the fact that smoker dentists are less likely to provide quitting advice to their patients. The finding that only 50% of students had such a belief may indicate that students were not aware of the negative influences of smoking behaviors by healthcare personnel, particularly that dentists are expected to model healthy behaviors. The smoking behavior of healthcare professionals and their lack of knowledge or awareness are important obstacles to tobacco cessation interventions in developing countries [37]. Helping smoker patients to quit and maintain tobacco cessation efforts is an important professional role of dentists that may be jeopardized when they actually engage in tobacco use [10]. Actively smoking dentists were less interested in anti-smoking campaigns than ex-smokers [38]. Therefore, Factors that hinder and promote dental students in educating their patients on the health risks associated with smoking and exposure to SHS should be identified and addressed.











The study has limitations. The study sample was recruited from one dental school in Saudi Arabia. The inclusion of a larger number of dental schools across the country is expected to provide more comprehensive data on tobacco use characteristics among this important group of the population. The study did not include religion as a variable because it is established that at the time of conducting this study, all inhabitants of Al Madina were Muslims, including our sample of dental students. Thus, any comparison relating to religion was not applicable. However, it would be more informative in future studies to include various geographic areas that may be influenced by important factors of culture, religion and ethnic backgrounds. Another limitation relates to the cross-sectional design and the self-perceived nature of collected data, which may lead to withholding some information, especially from female participants. We hope, though, that the anonymous nature of the survey has encouraged participants to provide accurate information. We also hope that this study provides an insight into the changing trends in tobacco use habits of dental students as an example of young generations and what role different social and professional confounders can play in shaping such a health risk behavior.

Conclusion

A substantial proportion of dental students in a conservative city in Saudi Arabia smoke tobacco and are exposed to SHS. Cigarette, waterpipe, and midwakh smoking were used by males and females to varying degrees. Our investigation revealed the need to start anti-tobacco education in the early years of university life,

with a focus on common forms of tobacco use, health hazards of tobacco on vulnerable populations, including children and pregnant women, and the role of healthcare professionals in tobacco cessation. In addition, public health authorities and higher education institutions should collaborate to reinforce the existing smoke-free policies in Saudi Arabia in public areas (including schools and universities).

Authors' Contributions

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SAE		https://orcid.org/0000-0002-3348-3382	Methodology and Writing - Original Draft.
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IL		https://orcid.org/0000-0002-9447-4391	Writing - Review and Editing.
NA		https://orcid.org/0000-0002-7853-4809	Writing - Original Draft.
NDO		https://orcid.org/0000-0002-6577-2373	Conceptualization, Methodology and Writing - Review and Editing.

All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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None.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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