Knowledge about tobacco smoking among medical students in Saudi Arabia: Findings from three medical schools

Hoda Jradi, Ali Al-Shehri

Knowledge about tobacco smoking among medical students in Saudi Arabia: Findings from three medical schools

Hoda Jradi *, Ali Al-Shehri

Community and Environmental Health, College of Public health and Health Informatics, KSAU-HS, NGHA, Riyadh, Saudi Arabia

Abstract   *Introduction:* Tobacco smoking is the leading cause of preventable death worldwide. Educating and training medical students about tobacco dependence prevention and treatment will prepare them for the task of helping smokers quit. In Saudi Arabia, little is known about medical students' knowledge on this topic.

Methods: This study was conducted among 237 medical students (89% response rate) from three medical schools in Saudi Arabia. Students were asked to complete a 55-item questionnaire about the knowledge of smoking epidemiology, smoking cessation practice and benefits, and treatment of tobacco dependence.

Results: The majority of the students (91.4%) do not have adequate knowledge about the epidemiology of smoking. Students demonstrated a low knowledge of the health risks associated with tobacco use (average score 53%; SD = 11.6), a fair understanding of the benefits of smoking cessation, and insufficient information about treatment of tobacco dependence. Respondents thought they were adequately prepared to counsel their patients to quit smoking.

Conclusions: Medical students in Saudi Arabia are not well informed and trained in tobacco dependence and treatment. It is necessary to address this deficit by prioritizing these topics in medical education curricula.

© 2014 Ministry of Health, Saudi Arabia. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

1. Introduction

Tobacco smoking is the leading cause of preventable death worldwide [1]. Currently, 5.4 million people die from tobacco-related diseases each year and 80% of those deaths occur in developing

* Tel.: +966 1142 95423, mobile: +966 541341144.
  E-mail addresses: Hoda.jradi@gmail.com, jradiho@ngha.med.sa (H. Jradi).

countries. In Saudi Arabia, the prevalence of smoking is approximately 21% among the general adult population and 25% among university students [2]. Tobacco-dependence associated health conditions and quality of life are known to usually improve upon cessation [3—6]; hence, tobacco-dependence treatment and counseling have been recommended to help smokers quit. Physicians can play a critical role in reducing the tobacco burden, as it has been documented in developed countries that even brief advice to the patient can substantially decrease smoking cessation rates [7,8]. A visit to the clinic can be an opportunity for physicians to counsel their patients about tobacco dependence. Lack of proficiency and training about tobacco dependence and cessation methods [9—11], lack of confidence and self-efficacy in counseling skills [9—12], lack of time [11,12], and a health system that does not support tobacco cessation services [12] are among the reasons why physicians do not intervene with patients that use tobacco. Low level of competence in tobacco cessation practice among doctors has been linked to low level of knowledge associated with the smoking cessation practice guidelines among medical students [13]. Medical students as future health care professionals, educators and researchers are in a key position to influence future tobacco cessation and control programs in Saudi Arabia and elsewhere [2,14—16]. There are no published studies that have reported on the extent to which medical students or physicians in Saudi Arabia are knowledgeable about tobacco dependence treatment, and no attention has been paid to the Saudi medical school's core curricula in tobacco education. The objective of this study is to measure knowledge related to smoking-related epidemiology, the harmful effects of smoking, and the efficacy of counseling techniques and pharmacotherapy among medical students from three medical schools in Saudi Arabia.

2. Methods

This was a cross-sectional study that was conducted during the 2011—2012 school year among fifth-year medical students enrolled at three medical schools in Saudi Arabia. This study was approved by the institutional Review Board at the sponsoring institution.

2.1. Study population

The study was conducted among 237 medical students from the fifth year cohort at three different medical schools from the central (King Saud Bin Abdul-Aziz University), western (King Abdul-Aziz University), and southern (Jazan University) regions of Saudi Arabia. Medical students in the introductory years were not included in the study because they are still learning the basic sciences, and medical students in their sixth year are hard to reach because they are mostly in clinical rotations and rarely in the classic classroom setting. After obtaining informed consent and explaining the purpose of the study, the questionnaire was completed in about 20 min before the start of a professional skill class. To be eligible, a medical student had to be in the target year for the medical school and understand English. All students who were enrolled in the three medical schools and were present in class during the period of data collection received a copy of the survey and were asked to participate.

2.2. Study instrument

The instrument used in this study mostly contained items that were adopted from previous studies conducted among medicals students for the same purpose [15—17], in addition to newly developed items related to demographics (Questionnaire available upon request). Students completed a 55-item self-administered questionnaire in English about demographic characteristics, smoking status, knowledge of smoking epidemiology, the practice of smoking cessation counseling, knowledge of treatment of nicotine addiction, and knowledge of the benefits of smoking cessation. The instrument was pilot tested among 20 medical students for validation purposes in terms of clarity and feasibility. Changes related to comprehension and clarity were made based on the pilot results.

2.3. Measures

The ''demographic characteristics'' section of the survey included questions related to age, gender, and marital status of the student, their smoking status, and if they are interested in quitting.

Measures related to the ''knowledge of smoking-related epidemiology'' included the health risks associated with smoking and exposure to second-hand smoke. Students were asked whether cigarette smoking greatly increases, slightly increases, or does not affect a smoker's risk for many chronic illnesses, such as cardiopulmonary diseases and cancer. They were also asked about the health risks associated with cigarette smoking during pregnancy and the percentage of adults (over the age of 18) who smoke in Saudi Arabia. Other questions

asked are about the components in tobacco smoke that are mainly responsible for the increased risk of coronary artery disease and the number of substances that have been identified in tobacco smoke. One question in this section addressed general knowledge related to the harmful effect of Waterpipe/Shisha smoking.

The ''practice of smoking cessation'' measure included items related to receiving any training or information related to smoking cessation, discussing smoking cessation with patients in clinical rotations, and the use of any interventions to help patients quit using tobacco products.

The ''knowledge of treatment of tobacco dependence'' was assessed using 8 questions. Questions in this section were related to the magnitude of the patients' chance of quitting after being counseled by a physician, asking patients about their smoking status, estimating the percent of patients capable of quitting smoking on their own, and the percent of smokers expected to successfully quit smoking with brief counseling by a physician. Other questions were about the use of pharmacotherapy, the effectiveness of several interventions in helping smokers quit (counseling, pharmacotherapy, hypnosis), the appropriate level of intervention for a patient who smokes and is not ready to quit, and contraindications for the use of nicotine replacement therapy and other pharmacotherapy.

The ''knowledge of the benefits of smoking cessation'' was measured using three items about the reduced risk for premature death, the time it takes for reversing the risk of developing heart disease after quitting smoking, and the time it takes before the chance of developing lung cancer returns to normal.

Other questions in the survey asked are if the student knew of any tobacco cessation service in the city they reside in, how well they believe they are prepared to advise/counsel their patients to quit smoking, and whether they support a complete ban on smoking on their campus. Two additional items addressed the perception of smoking and life-expectancy. Similar to the surveys by Raupach et al. [15] and Grassi et al. [17], the medical students were asked if they knew lifelong smokers and non-smokers (2 questions) that lived to be 90 years old.

2.4. Data analysis

Collected data were entered manually into a database. For the purpose of scoring, the questions were grouped by relevance to the medical student's practice of smoking cessation, knowledge of treatment for tobacco dependence, knowledge of the benefits of smoking cessation, knowledge of the epidemiology of smoking, and demographic characteristics. Acceptable answers to each of the questions were based on published research, reports, and smoking cessation clinical practice guidelines. Scores were computed based on the correct answers for grouped questions related to the health risks associated with smoking, second-hand smoking, and smoking during pregnancy. Similar to other studies [13,17], scores were converted to percentages for ease of interpretation. A score of 70−79% was considered good, while a score of less than 60% (average) was considered poor. Percent correct answers for all other questions were tabulated collectively for the three medical schools. Statistical comparisons between groups (smokers vs. non-smokers) were performed using two sample t-tests for continuous variables, Chi-square for discrete variables, and analysis of variance (ANOVA) when necessary. A conventional level of $P < 0.05$ for alpha was used to establish statistical significance. Data analysis was performed using Stata12 (2011, College Station, Texas).

3. Results

The survey was administered to 237 fifth-year students from three medical schools. Of these, 212 responded, for an overall response rate of 89%. Only 16% of the total sample participants were females, and the female medical students were from one medical school. The other two medical schools did not have female medical students.

3.1. Medical students' demographic characteristics and tobacco use

Demographic characteristics are reported in Table 1. The mean age (SD) for the students was 21.6 (2.1) years. Approximately 19.4% were current smokers of cigarettes (12% of females and 18% of the males) and 14% reported ever smoking during their lifetime. Almost 17% reported current waterpipe/Shisha smoking. Few students ($n = 16$) who were current tobacco users reported a quit attempt in the past 12 months and 12% reported that they wanted to quit but they were not ready to try yet. There was a significant difference in the smoking status of the medical students from the three different medical schools ($\chi^2 = 39.0$; $P < 0.001$); the majority of the smokers (46%) were from the central region of Saudi Arabia. Only 5.5% of the students reported that they have been advised by a health professional to stop smoking during the past year.

Table 1 Gender and smoking status of fifth-year medical students from three medical schools, Saudi Arabia, 2012—2013.

Characteristic	N	%
Gender (N = 205)		
Male	172	83.9
Female	33	16.1
Smoking status		
Cigarette smoking (N = 194)		
Never smoker	146	75.3
Ever smoker	27	14.0
Current smoker	37	19.4
Former smoker	22	11.3
Waterpipe/Shisha smoking (N = 199)		
Yes	33	16.6
No	146	73.4

3.2. Knowledge of smoking-related epidemiology

The average score for ''knowledge of health risks'' was 53% (SD = 11.6), which suggests that the surveyed medical students had, in general, a low level of knowledge related to this topic. As can be seen in Table 2, only 8.6% of the students correctly estimated the prevalence of smoking in Saudi Arabia and nearly 16% did not even attempt to give an estimate. About 70% correctly estimated that two thirds of current smokers began smoking before 18 years of age. Few students (16%) responded that carbon monoxide (CO) is the com-ponent of tobacco smoke that is mainly responsible for the increased risk for coronary artery disease. Substances mentioned by at least 42% of the medical students were nicotine, tar, or a combination of both substances. Approximately 24% knew that more than 4,000 substances have been identified in tobacco smoke. Almost 75% of the students knew the health risks of second-hand smoke; however, the average score for adequate knowledge of the health risks of smoking during pregnancy was poor (35%; SD = 10.7). There was no significant difference between smokers and non-smokers with regard to ''knowledge of the health risks'' of cigarette smoking, second-hand smoke or smoking during pregnancy.

3.3. Knowledge of the benefit of smoking cessation

Table 3 shows the percent response per item for the knowledge of smoking cessation items. Only 13.6% of the students knew that it will take someone up to 15 years before their chances of developing heart disease return to normal after quitting tobacco. Approximately 26.7% of the participants thought that the risk for lung cancer after cessation never returns to normal and 12.6% correctly knew that the risk of dying from lung cancer is about half for a person who smokes after 10 years of cessation. The majority of the students (76.3%) answered correctly that stopping smoking at any age reduces the risk of premature death.

Table 2 Tabulation of correct responses to the epidemiology of smoking questions.

Survey topic	N	%
Percent of Saudi Arabian adults who smoke (N = 208)		
Responses within acceptable range (21—25%)	18	8.6
More than 2/3 of smokers start before age 18 (N = 208)		
Correct response (true)	145	69.5
Health risks of cigarette smoking (13 items) (N = 205)		
Correct response for 0—7 items	40	19.5
Correct response for 8—10 items	50	24.4
Correct response for more than 11 items	115	50.1
Health risks of secondhand smoke (5 items) (N = 205)		
Correct response for 0—3 items	58	28.3
Correct response for 4—5 items	147	71.7
Health risks of cigarette smoking during pregnancy (3 items) (N = 205)		
Correct response for 0—1 items	85	41.5
Correct response for 2 items	44	21.5
Correct response for 3 items	76	36.9

Table 3 Tabulation of correct responses about the knowledge of smoking cessation benefits.

Survey item	N	%
Time to return risk of heart disease to normal (N = 206)		
Correct response (15 years)	28	13.6
Time to reduce risk of lung cancer by half after smoking cessation (N = 206)		
Correct response (10 years)	26	12.6
Stopping smoking at any age reduces risk of premature death (N = 206)		
Correct response(true)	157	76.3

3.4. Knowledge and training in the practice of smoking cessation

With respect to the practice of smoking cessation, surprisingly, 79% of the students reported not having any clinical training while in medical school on smoking cessation, while 50% reported receiving lectures/seminars on the topic. Few students (8%) replied that they usually discuss smoking cessation with patients in clinical rotations or in the hospital; the majority (68%) reported that they never perform such a service. Mostly, the students did not know which interventions are being applied to help patients quit smoking within their health system; however, one fourth of them thought that counseling is the most used intervention, followed by referral to a specialized clinician (19%). Actually, only 20.9% of the respondents thought they were adequately prepared to counsel/advise their patients to quit smoking.

3.5. Knowledge of treatment of nicotine addiction

Table 4 shows the medical students' response to the questions associated with knowledge of treatment of nicotine addiction. Many students (62.4%) knew that nicotine is as addictive as other drugs such as heroin or cocaine. Nearly 44% of them correctly reported that a patient's chance of quitting doubles if advised by a health professional to do so. Approximately half of the students (52.8%) recognized that a physician should discuss smoking with their patients during every visit and 28.8% correctly estimated the percent of smokers who try to quit on their own successfully. One fourth of the students knew that 20% to 40% of smokers are expected to successfully quit with brief counseling by a physician and the use of pharmacotherapy. Only 18.4% knew that nicotine replacement therapy (NRT) is not contraindicated for people with cardiovascular disease; however, 88% recognized that it is highly or somewhat effective. Almost half of the students (47.8%) answered ''Do not know'' for the effective-ness of fluoxetine and 63% answered the same way for the effectiveness of bupropion.

3.6. General knowledge about tobacco-related issues and preparedness for tobacco-dependence counseling

Regarding the questions on the perception of smoking and life expectancy, most of the students (73.6%) reported not knowing a smoker who lived to be 90 years of age. About 66% of them reported knowing a non-smoker that lived to be the age of 90. There was a significant difference between smokers and non-smokers in replying to knowing a smoker who lived to be the age of 90 years (P < 0.001). There was no significant difference among the two groups for knowing a non-smoker that lived to be that age (P = 0.41). When asked about knowledge of availability of tobacco dependence treatment programs/services in Saudi Arabia, to which a patient willing to quit smoking can be referred to, almost three fourths (74.4%) replied with either ''No'' or ''Don't Know''. Unfortunately, many of the medical students (33%) were still reluctant to support a complete ban of smoking on campus.

4. Discussion

After a thorough review of the literature, it was concluded that a survey of medical students related to the knowledge of smoking issues and tobacco dependence and treatment has never been conducted in Saudi Arabia. Similar surveys were previously conducted among medical students in the world [9,11,14—19]. This study adds to the literature related to the control of the tobacco epidemic and the involvement of health professionals in this public health initiative. Results showed that Saudi medical students from three distinct medical schools have limited knowledge of the health risks associated with tobacco smoking, and a fair understanding of the benefits of smoking cessation and the practice of cessation. Recent

Table 4 Tabulation of correct responses about the knowledge of treatment for nicotine addiction (N = 212).

Survey item	N	%
Knowledge of quitting		
Smokers expected to quit on their own (acceptable range 60%-80%)	61	28.7
Knowledge of clinical practice guidelines		
Physicians should ask about smoking status at every visit	112	52.8
Smoker's chance of quitting doubles with provider's help	92	43.8
Nicotine is as addictive as heroin or cocaine	132	62.3
Best interventions to those not ready to quit are personalized advice and self-help material	81	38.2
Knowledge of pharmacotherapy		
Percent smokers who quit with provider counseling and nicotine replacement therapy (NRT) (acceptable range 20%-40%)	52	24.5
NRT is highly or somewhat effective	184	86.7
Fluoxetine is not at all effective	29	13.7
Bupropion is highly or somewhat effective	94	44.3
Knowledge of contraindications		
NRT is contraindicated for cardiovascular disease (False)	39	18.4
Bupropion is not contraindicated for pregnancy	6	2.8
Knowledge of cessation treatment		
Counseling is somewhat effective	101	47.6
Hypnosis is ineffective	16	7.5

studies conducted in Italy, England, and Germany among a similar cohort of students [15,17] showed that the knowledge of the epidemiology of smoking was also low. A minority of the students in this study correctly estimated the percentage of Saudi adults who smoke. Surprisingly, the average score for the knowledge of health risks associated with cigarette smoking and the average score for the knowledge of the health risks of smoking during pregnancy were also considerably low, a suggestion that their medical education may have failed to integrate these topics in the curriculum. This finding is in line with other studies conducted elsewhere, which reported that medical education is lacking in tobacco dependence [7,11,15—17]. Many of the students showed a positive attitude toward the benefits of smoking cessation since many of them reported that the risk for developing heart disease is reversible and can return to normal after cessation. However, many of them underestimated the period it takes for lung cancer risk to go back to normal. A few thought that the risk persists forever. The level of information among this cohort of medical students from Saudi Arabia is insufficient and rather sporadic in nature. Rarely did medical students reply that they usually discuss smoking cessation with patients in clinical rotations or in the hospital. The entire management of tobacco dependence is unclear for these students — a real concern since the majority of

them never performed such a service. A small percentage knew that NRT is not contraindicated for people with cardiovascular disease. Smokers with cardiovascular problems may miss opportunities to overcome tobacco dependence because an uninformed physician, on the topic of smoking cessation, is reluctant to suggest Nicotine Replacement Therapy as a treatment for their addiction. Even though this study did not attempt a comparison between medical schools and smokers and non-smokers for many of the response items, there was a significant difference in the smoking status of the medical students from the three different medical schools; the reason for this difference is unknown. Smokers were more likely than non-smokers to overestimate the life expectancy of a smoker; this may be due, according to Raupach et al. [15], to the fact that the student-smoker has emerged from a community with a high prevalence of smoking and is more likely to personally know a 90-year-old lifelong smoker or possesses the desire to believe that smokers may live to be 90 years of age. In general, the results of this survey are quite striking, as a large number of these students are on the lower end of the proficiency scale in tobacco-dependence treatment and practice guidelines compared with published results for other medical students from Europe and the United States [15—17]. Smoking prevalence among the students is somewhat similar to the reported

smoking prevalence among the population in the country. Many of them, to the disappointment of this study, still did not want to support a tobacco-free campus.

5. Limitations

This study was conducted among medical students from three different medical schools located in three different regions of Saudi Arabia. The surveyed medical students are not necessarily representative of all medical students in the country, and the medical school curriculum from the three medical schools is not necessarily representative of other medical schools' curriculum. Individual examination of medical school curricula on the inclusion of tobacco dependence and reported student proficiency should be addressed by further studies. A more important limitation of this study is that these students are in the pre-training year and may not have had the chance to be exposed to the clinical practice guidelines in tobacco dependence. However, this limitation should not compensate for the fact that they demonstrated a low level of knowledge on the topic. A limitation that this study had no control over is that most of the surveyed students were males and that the females were only from one of the medical schools.

6. Conclusions

This study showed a lower-than-expected level of training in tobacco-dependence treatment and an apparent deficit in medical education curricula in tobacco dependence among this cohort of medical students from Saudi Arabia. Medical school faculty, public health organizations and the Ministry of Health should promote the inclusion of tobacco-dependence treatment education and training for medical students in the undergraduate and post-graduate medical training.

Declaration of interests

No competing interests to declare.

Contributorship

All authors have contributed to this publication and hold themselves jointly and individually responsible for the content. This research was supported by a modest Grant from KAIMRC (King Abdul-Aziz International Medical Research Center.

Conflict of interest

None declared.

References

[1] WHO 2010. World health report: Health systems financing-the path to universal coverage. Geneva, Switzerland. http://www.who.int/whr/2010/whr10_en.pdf (Retrieved January 12, 2013).

[2] Al-Haqwi A, Tamim H, Asery A. Knowledge, attitude, and practice of tobacco smoking by medical students in Riyadh, Saudi Arabia. Ann Thorac Med 2010;5(3):145—8.

[3] U.S. Department of Health and Human Services. 2010. How tobacco smoke causes disease: the biology and behavioral basis for smoking-attributable disease: a report of the surgeon general. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. http://www.surgeongeneral.gov/library/reports/tobacco-smoke/index.html (Retrieved January 12, 2013).

[4] Anthonisen NR, Skeans MA, Wise RA, Manfred J, Kanner RE, Connett JE. The effects of a smoking cessation intervention on 14.5-year mortality: a randomized clinical trial. Ann Intern Med 2005;142:233—9.

[5] Doll R, Peto R, Beoreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. Br Med J 2004;328:1519.

[6] Toh CK, Wong EH, Lim WT, Leong SS, Fong KW, Wee J, et al. The impact of smoking status on the behavior and survival outcome of patients with advanced non-small cell lung cancer: a retrospective analysis. Chest 2004;126:1750—6.

[7] Fiore MC, Jaén CR, Baker TB, Bailey WC, et al. 2008. Treating tobacco use and dependence: 2008 update. Clinical practice guideline. Rockville, MD: U.S. Department of Health and Human Services 2008. Public Health Service. http://www.surgeongeneral.gov/tobacco/treating_tobacco_use08.pdf. (Retrieved January 5, 2013).

[8] Tønnessen P, Carrozzi L, Fagerström KO, Gratziou C, et al. Smoking cessation in patients with respiratory disease: a high priority, integral component of therapy. Eur Res J 2007;29:390—417. http://dx.doi.org/10.1183/09031936.00060806.

[9] Geller AC, Brooks DR, Powers CA, Brooks KR, Rigotti NA, Bognar B, et al. Tobacco cessation and prevention practices reported by second and fourth year students at US medical schools. J Gen Intern Med 2008;23:1071—6.

[10] Spangler JG, Enarson C, Eldridge C. An integrated approach to a tobacco-dependence curriculum. Acad Med 2001;76(5):521—2, http://journals.lww.com/academic-medicine/Fulltext/2001/05000/An_Integrated_Approach_

to_a_Tobacco_dependence.55.aspx#P17 /jama.282.9.825 (retrieved December 5,2012).

[11] Ferry LH, Grissino LM, Runfola PS. Tobacco dependence curricula in US undergraduate medical education. J Am Med Assoc 1999;282:825—9.

[12] Rigotti NA, Thorndike AN. Reducing the health burden of tobacco use: what's the doctor's role? Mayo Clin Proc 2001;m 76:121—3, http//www.mayoclinicproceedings.com/pdf%2F7602%2f7602el.pdf (retrieved December 12, 2013).

[13] Raupach T, Merker J, Hasenfuβ G, Andreas S, et al. Knowledge gaps about smoking cessation in hospitalized patients and their doctors. Eur J Cardiovasc Prev Rehabil 2011;18:334—41.

[14] Powers C, Zapka J, Bognar B, et al. Evaluation of current tobacco curriculum at 12 US medical schools. J Cancer Educ 2004;19:212—9.

[15] Raupach T, Shahab L, Baetzing S, Hoffmann B, et al. Medical students lack basic knowledge about smoking: findings from two European medical schools. Nicotine Tob Res 2009;11:92—8.

[16] Springer CM, Tannert Niang KM, Matte TD, Miller N, Bassett MT, Frieden TR. Do medical students know enough about smoking to help their future patients? Assessment of New York City fourth-year medical students' knowledge of tobacco cessation and treatment for nicotine addiction. Acad Med 2008;83:982—9.

[17] Grassi MC, Chiamulera C, Baraldo M, Culasso F, et al. Cigarette smoking knowledge and perceptions among students in four Italian medical schools. Nicotine Tob Res 2012;14(9):1065—72.

[18] Chatkin J, Chatkin G. Learning about smoking during medical school: are we still missing opportunities? Int J Tuberc Lung Dis 2009;13:429—37.

[19] Schkrohowsky JG, Kalesan B, Alberg AJ. Tobacco awareness in three U.S. medical schools. J Addict Dis 2007;26:101—6.