

Tobacco consumption and environmental exposure among healthcare students in King Saud University in Riyadh

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ABSTRACT

Objectives: The goal of this study was to determine the prevalence of tobacco smoking in healthcare students at a university in Riyadh, Saudi Arabia, along with environmental exposure and potential influential factors. **Methods:** This observational cross-sectional study was conducted at King Saud University from January-April 2019. It included 1,273 randomly selected male and female first- to fifth-year undergraduate healthcare students from all health colleges at the university. The study used a self-administrated questionnaire and descriptive data analysis. Associations between variables were tested using a Chi-square test with the statistical significance set at P value < 0.05 . **Results:** Among the 1,273 respondents, the prevalence of tobacco product smoking was 13.7%. The prevalence was highest in the College of Applied Science (34.5%) and lowest in the College of Pharmacy (10.9%). Among those 18- to 21-year-olds, the prevalence was 43.1%, while it was 51.1% for the 22–25 age group and only 5.8% for those 26 or older. Common reasons for smoking cigarettes included having fun or passing time (45.2%) and relieving stress (33.3%). Among those who smoked a water-pipe (12.5%), the most common reason was to enjoy its flavors (42.1%). The prevalence of secondhand smoking at home was 31.7%, and environmental exposure was 42.5%. **Conclusion:** Tobacco consumption is a common problem among healthcare students including cigarette as well as the increasing consumption of water-pipe in addition to secondhand smoking. Along with proven strategies to promote smoking cessation, including smoke-free laws, improved access to effective quitting treatments and media campaigns are needed to reduce tobacco consumption.

Keywords: Environmental exposure, healthcare students, prevalence, smoking, water-pipe

Introduction

When tobacco smoke is inhaled, nicotine rapidly enters the bloodstream through pulmonary circulation. Inhaled nicotine escapes the first pass intestinal and liver metabolism. Nicotine readily

crosses the blood-brain barrier, promptly diffusing into the brain tissue. The process takes only two to eight seconds from the moment of inhalation, and the half-life of nicotine in the human body is estimated to be around 2 hours from the time of consumption.^[1] Tobacco consumption is one of the leading causes of preventable deaths worldwide; it can have detrimental effects on multiple organ systems and is the basis of many chronic diseases.^[2] In the United States for 2005–2009, the results indicated that cigarette smoking and exposure to tobacco smoke led to at least 480,000 premature deaths annually.^[3] In fact, smokers today are not only harming themselves but may also be hurting the people around them, who

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are considered passive smokers. Passive smoking (PS) is defined as the involuntary inhalation of tobacco particles due to exposure to tobacco smoke. Exposure to secondhand smoke (SHS) causes significant disease and death, including ear infections, frequent and severe asthma attacks, respiratory infections among children, and sudden infant death syndrome among infants. A study conducted in New York City found that two-thirds of residents (67%) reported seeing people smoking in common areas, and 60% reported smelling smoke in their apartments that had originated elsewhere.^[4]

The consumption of tobacco products can lead to many complications. The individuals who are heavy smokers over a long duration had a 90% likelihood of lung cancer and tobacco kills a third to half of all people who use it, on average 15 years prematurely.^[5] Another study found an increase in the risk of community-acquired pneumonia among passive smokers aged 65 or older.^[6] A third study found that coronary heart disease was a major risk factor in 38.9% of cardiac patients who were smokers.^[7] In addition, in a study in the Middle East from 1994-2014, the prevalence of stroke in the smoking population was 19.3%^[8] and the prevalence of dementia was 1.47%.^[9] Meanwhile, another study showed smoking to be responsible for 20% of rheumatoid arthritis cases overall.^[10]

According to our Gulf society, cigarette production has been increasing at an average of 2.2% each year, outpacing the population growth rate of 1.7%.^[11] The same study found that high school students who began smoking 14 years of age self-rated their health as poorer than later initiators and those who never smoked. Poorer self-rated health continued after smoking cessation among early initiators.^[12]

In developed countries, such as the US, cigarette smoking prevalence among adults declined from 20.9% (45.1 million persons) in 2005 to 16.8% (40.0 million) in 2014, representing a 19.8% decrease.^[13] In comparison, the average smoking rates in Saudi Arabia, which were calculated by averaging statistics from several studies over a 16-year period, showed that 35–40% of adult males were regular smokers.^[14] The most recent nationally representative showed that the prevalence of smoking in Saudi Arabia was 12.2% in 2013, and the prevalence was 27.9% among males and 2.9% among females.^[15]

Meanwhile, a study of medical and nursing students in Bahrain showed the prevalence of ever smoking any type of tobacco was 22.4% (medical: 25.8%, nursing: 37.5%) and the prevalence of smoking a water-pipe was 17.7% (medical: 20.0%, nursing: 13.6%).^[16] In Sudan, a study conducted at a medical college showed that 6.6% of first-year students were smokers, while 14.4% of fifth-year students were smokers, while 31% of all students provided a family history of smoking.^[17]

In Saudi Arabia, a national survey in 2013 measured tobacco consumption among 10,735 individuals aged 15 or older; the results showed that 12.2% were smokers, and the mean age of smoking initiation was 19.1.^[15] In February 2015, a comparison

of the prevalence of smoking among 408 Saudi female students from different departments of the College of Applied Medical Sciences in Dammam showed that 13.3% had tried smoking and 0.9% of those respondents were active smokers.^[18]

In 2005, a study in central Saudi Arabia by Al-Turki estimated the prevalence of smoking habits among 322 male medical students; the results showed that 13% were current smokers, 5.3% were ex-smokers, and 38.2% were passive smokers.^[19] In 2011, a study of 643 medical students in western Saudi Arabia found the prevalence of tobacco smoking to be 24.8% among the males and 9.1% among the females.^[20] In 2013, a study in Riyadh by K. M. Almutairi estimated the prevalence of tobacco use and exposure to environmental tobacco smoke among Saudi medical students; of the 805 respondents, 11.3% experimented with cigarette smoking and 4.7% were current smokers.^[21]

This study was conducted in one of the biggest universities in Saudi Arabia to see the current prevalence of smoking among different colleges of healthcare students including the cigarette tobacco smoke as well as water-pipe smoke and also touched the secondhand smoke. As we hypothesize that 10% of students are smokers and for secondhand smoke less than 50% of students will be exposed to environmental and less than 15% are home exposed.

Methodology

The present study examined tobacco product prevalence through an analytical cross-sectional study among healthcare students at five major health colleges of King Saud University in Riyadh, Saudi Arabia, from January-April 2019. The colleges (College of Medicine, College of Dentistry, College of Pharmacy, College of Nursing, and College of Medical Applied Science) were stratified according to specialty type and number of registered students.

Target population (sampling)

We used the following formula to calculate the sample size:

$[N = Z^2 \times (P) \times (1-P)/D^2]$, where (P) is the average prevalence from previous studies in this field (20%), and (Z) is a constant value (1.96) with a 95% confidence interval for precision with 80% power (D = 0.05). Based on this mathematical technique, we needed at minimum of 246 students to complete the survey.

The questionnaire was administered to first- to fifth-year undergraduate male and female medical students at their designated classrooms in the selected health colleges. In total, 1,273 students completed the questionnaire. Microsoft Excel was used to randomly select the study sample within each year and gender after getting the list of students' names from the vice dean office of student affairs.

The study was approved by the Institutional Review Board (IRB) of the College of Medicine, King Saud University, and performed

in accordance with the ethical standards laid out in 1964's Declaration of Helsinki and its later amendments.

Instrumentation

The self-administered questionnaire included many domains, covering the students' demography (age, gender, college, and academic year), consumption of various forms of tobacco products (cigarettes and water-pipes), and related behaviors. In addition, possible factors leading to tobacco usage, the prevalence of environmental and home exposure to passive smoking, behaviors related to smoking cessation, and possible reasons for smoking abstinence were also included.

The survey consisted of 26 questions divided into five sections, each of which needed to be answered by tobacco product users. If the student was a non-smoker, only seven questions needed to be answered.

The questionnaire was distributed in English and Arabic for increased accuracy and validated by a consultant in family medicine and another consultant in community medicine. The instrument was first pilot tested among 20 healthcare students for validation in terms of feasibility and clarity and to determine whether any changes were needed. To assess internal consistency, Cronbach's alpha was calculated as 72%.

The informed consent process was clear and indicated the purpose of the study and the right of the participants to withdraw at any time without any obligation toward the study team.

Statistical analysis

All data was analyzed using Statistical Package for Social Studies version 22 (SPSS 22; IBM Corp., New York, NY, USA). Categorical variables were expressed as percentages. The Chi-square test was used for categorical variables. A *P* value < 0.05 was considered statistically significant.

Results

The survey was administered to 1,273 students who fulfilled the inclusion criteria (61.7% males, 38.3% females). The prevalence of current tobacco users among the healthcare students was 13.7%.

The respondents were distributed over different academic years. There were 194 first-year (preclinical) students (15.2%), 407 second-year (clinical) students (32.0%), 286 third-year students (22.5%), 237 fourth-year students (18.6%), and 149 fifth-year students (11.7%). Among the respondents, 451 were from the College of Medicine (35.5%), 162 from the College of Dentistry (12.7%), 188 from the College of Pharmacy (14.8%), 331 from the College of Medical Applied Science (26.0%), and 140 from the College of Nursing (11.0%) [Table 1].

The prevalence of tobacco product consumption among the males (20.6%) was 10 times higher than that among the

females (2.5%), as shown in Table 2. Most of the tobacco users started smoking less than four years before the survey (72.9%). The highest prevalence of smoking was among the third- and second-year students (27.6% and 27%, respectively). For those 18–21 years old, the prevalence was 43.1%; in the 22–25 age group, it was 51.1%; and for those 26 or older, it was only

Table 1: Demographic characteristics

	Total No. (1,273)	Percentage
Age group:		
18-21 years	779	61.2
22-25 years	465	36.5
26-older	29	2.3
Gender:		
Female	488	38.3
Male	785	61.7
Academic year:		
1 st year	194	15.2
2 nd year	407	32.0
3 rd year	286	22.5
4 th year	237	18.6
5 th year	149	11.7
College:		
College of Medicine	451	35.5
College of Dentistry	162	12.7
College of Pharmacy	188	14.8
College of Medical Applied Science	331	26.0
College of Nursing	140	11.0

Table 2: Prevalence of and reasons for tobacco smoking

	Number	Prevalence (%)	<i>P</i>
Total	174	13.7	
Gender:			
Female	12	2.5	0.1268
Male	162	20.6	
Age group:			
18-21 years	75	43.1	0.3
22-25 years	89	51.1	
26-older	10	5.8	
Academic year:			
1 st year	20	11.5	0.1
2 nd year	47	27.0	
3 rd year	48	27.6	
4 th year	38	21.8	
5 th year	21	12.1	
College:			
College of Medicine	47	27.0	0.2
College of Dentistry	23	13.2	
College of Pharmacy	19	10.9	
College of Medical Applied Science	60	34.5	
College of Nursing	25	14.4	
Reasons:			
For fun or to pass the time	79	45.2	0.2
For stress relief	58	33.3	
For stress relief/for fun or to pass the time	32	18.5	
For attraction	5	3.0	

5.8%. The study also showed variation between the colleges, as the prevalence of smoking was highest in the College of Medical Applied Science (34.5%) and lowest in the College of Pharmacy (10.9%) [Table 2].

Most smokers (93.4%) consumed less than 20 cigarettes per day, and only 6.62% smoked more than 20 cigarettes per day. The majority of the cigarette smokers (45.2%) claimed that it was for fun or to pass the time, while 33.3% smoked to reduce stress. As shown in Table 2, most of the smokers smoked their first cigarette more than 30 minutes of awakening (61.6%), while 13.2% smoked in less than 10 minutes and 25.2% in 10–30 minutes.

The prevalence of water-pipe smokers was 12.5%; the majority of these students (42.1%) smoked a water-pipe to enjoy its flavor, while 27.7% smoked for fun or to pass the time, and only 5.0% smoked to relieve stress. More than half (58.5%) smoked a water-pipe monthly or occasionally, and only 8.8% used it on a daily basis [Table 3].

Table 3: Characteristics of water-pipe smoking

Water-pipe smoking	Total No. 159	Prevalence (%) 12.5
Frequency of water-pipe smoking:		
Daily	14	8.8
3-4 days per week	17	10.7
Weekends	35	22.0
Monthly (occasionally)	93	58.5
Reason for water-pipe smoking:		
To enjoy its flavor	67	42.1
For fun or to pass the time	44	27.7
For fun or to pass time and to enjoy the flavor	37	23.3
For stress relief	8	5.0
For attraction	3	1.9

Among the female students, 51.2% had tobacco users in their families, while this was the case for 48.8% of male students. Only 31.7% of all respondents were exposed to tobacco smoke by their family members. The results also indicated that 8.6% of the students spend time with their families while one member of family smokes on a daily basis and 10.5% do so monthly or occasionally. In addition, 42.5% spend their time with their friends while smoking. Where 491 (62.6%) of males and 50 (10.3%) of females spend time with friends who smoke. For this, the ratio of male to female students was 10:1. The percentage of students who spend time with their friends on a monthly basis was 11.7% [Table 4].

Discussion

The main objective of our study was to estimate the prevalence of tobacco consumption among healthcare students, along with influential factors. The results of this study demonstrated a significant increase in tobacco consumption compared to our hypothesis. The findings helped prove that healthcare students have a higher prevalence and an increment by 3.67% than our hypothesis which was 10%. In addition, the main reasons for smoking identified in the present study, were having fun and passing time, whereas relieving stress ranked as the second reason for some respondents.

The prevalence of smoking in the present study was lower than that of a study conducted in western Saudi Arabia by A. Hashim among healthcare workers aged 19–30 years, which was 18.4%,^[22] but close to a study conducted in eastern Saudi Arabia, in which the prevalence of smoking among medical students was 15.1%.^[23] Meanwhile, the prevalence in a similar study among healthcare students in different US colleges was somewhat higher overall (16.8% versus 13.7%), nearly the same prevalence among males (20.8% versus 20.6%), and much higher among

Table 4: Secondhand smoking

	Male (%) Total n=785	Female (%) Total n=488	Overall (%) Total n=1273
Tobacco product use by a family member:			
Yes	53.4 (419)	51.2 (250)	52.6 (669)
No	46.6 (366)	48.8 (238)	47.4 (604)
Sitting with a family member who smokes:			
Yes	36.4 (286)	26.0 (127)	31.7 (403)
No	63.6 (499)	74.0 (361)	68.3 (870)
Tobacco product exposure by a family member:			
Daily	27.3 (78)	25.2 (32)	8.6 (110)
3-4 days per week	22.0 (63)	22.1 (28)	7.2 (91)
Weekends	19.9 (57)	16.5 (21)	6.1 (78)
Monthly (occasionally)	30.8 (88)	36.2 (46)	10.5 (134)
Sitting with friends who smoke:			
Yes	62.6 (491)	10.3 (50)	42.5 (541)
No	37.4 (294)	89.7 (438)	57.5 (732)
Frequency of tobacco product exposure by friends:			
Daily	27.1 (133)	20.0 (10)	11.2 (143)
3-4 days per week	20.4 (100)	6.0 (3)	8.1 (103)
Weekends	27.7 (136)	20.0 (10)	11.5 (146)
Monthly (occasionally)	24.8 (122)	54.0 (27)	11.7 (149)

females (13.8% versus 2.5%).^[24] Furthermore, a similar study in Rome had a higher prevalence of smoking among medical students (35% versus 27%) and nursing students (48.2% versus 14.4%).^[25] In a study in Japan, the overall prevalence of smoking among healthcare students was 13.7%, which was the same to our study.^[26] Another study in Japan found a higher smoking prevalence among nursing students than our study (23.5% versus 14.4%).^[27]

A study was conducted in India including government college students where the prevalence of ever smoking among them was 21.3% and it was significantly higher among the males,^[28] which came to be higher than the prevalence among healthcare students.

Regarding the second hypothesis of secondhand smoke, we assumed the environmental exposure would be less than 50% and home exposure would be less than 15%. The study showed a 7.5% decrease in environmental exposure and a 16.7% increment in home exposure than our expectation. A US study on SHS among youth showed a prevalence of 11.6%, which was one-third of our finding.^[29]

The prevalence of tobacco environmental exposure in the present study was less than the study conducted by Almutairi KM^[21] (42.5% versus 57.7%). However, there was a significant increase in the prevalence of home exposure in this study by more than double compared to the same study conducted by Almutairi KM (31.7% versus 13.9%). This indicates that passive smoking poses a risk to Saudi healthcare students, as it might increase their health hazards.

A study was conducted in India revealed that the exposure to SHS in the home was 29.2%, more among young females,^[30] which was near the same exposure in our study.

Psychosocial stressors, including acute negative life events and chronic strains, have been implicated as risk factors for tobacco use. Psychological stress influences smoking behavior (e.g. initiation, maintenance, and relapse)^[30] as this was supported in our study where the second reason why smoke was relieving stress given by one third of respondents. The present study revealed that those who responded that smoking relieve stress was more or less similar to the one conducted in US by Slopen N^[31] (33.3% versus 36%). Furthermore, smokers who would like to quit but are exposed to high levels of psychosocial stress may have an insufficient capacity and be less motivated to control their urges to smoke.

Cigarettes are a consumption event that facilitates a brief social interaction during study periods, when college students may feel isolated from their friends. Cigarettes also serve as an idiom of distress for smokers, non-verbally signaling to others that they are stressed.^[32] Students described using smoking to manage their stress and help manage “secondhand stress” from their friends and classmates.

There are few studies on water-pipe consumption. In a study in Bahrain, the prevalence was somewhat higher than in our study (17.7% versus 12.5%).^[16] More recently in 2019, a study in Sudan among school and healthcare students of three colleges (medical, dental, and nursing) showed a higher prevalence of water-pipe use than in our study (33.8% versus 12.1%).^[33] The strong smell of fruit-flavored tobacco and the fact that a water-pipe is usually smoked in groups would allow the use of water-pipe, especially at weekends, as shown in our study as near a quarter responded.

One of the strengths of the present study is that it included a significant number of females in the sample, as most of previous local studies were limited to males only.

Primary care clinicians are the first advisors in talking with such group of ages about the harms of smoking and other reasons not to start smoking. Primary care physicians can provide a strong message on the importance of total abstinence from tobacco use, provide counseling interventions to aid adolescent smokers in quitting smoking, and ask parents about tobacco use and offer them cessation advice and assistance to protect children from secondhand smoke.

Limitation

This study also has some limitations, including that information was not sought such as behaviors and attitudes related to tobacco product control. In addition, the study does not examine healthcare students in other colleges. However, the study considers the main portion of healthcare students in the country, as it was conducted in the biggest university in Saudi Arabia. Therefore, it can have a great influence and help promote health awareness in other healthcare colleges and institutions.

Conclusion

The present study was designed to examine the prevalence of tobacco smoke including cigarettes as well as water-pipe among healthcare students who represent young adults, confirming the importance of continuous review of policies and prevention programs. There has been an alarming increase in water-pipe tobacco smoking among students as it is increasingly considered as an acceptable alternative to cigarettes.

From a research perspective, the high prevalence of tobacco use by the study population calls into question what other factors in the environment, including cultural norms, seem to promote smoking and result in such a high percentage of future health professional being tobacco users.

Recommendation

Based on the present study, several recommendations can be made. Healthcare students should be educated and trained by their schools to use effective strategies to deal with stress. Tobacco consumption is not clearly addressed in the curriculum

of the healthcare college, and the healthcare students are not skillfully prepared to stop smoking themselves or help others to quit smoking.

Further studies on smoking prevalence among female healthcare students and studies testing the effect of the new small tobacco pipe, should be conducted for increased understanding. Also, we need intervention studies to see the impact of smoking cessation program on the rate of quitting.

Clearly, smoking cigarettes remains a national concern despite the apparent effectiveness of tobacco awareness programs, especially among young adults. In fact, smoking rates have actually increased among this population during much of the past decade. Therefore, along with proven strategies to promote smoking cessation, including smoke-free laws, improved access to effective quitting treatments, cigarette price increases, and media campaigns are needed.

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Conflicts of interest

There are no conflicts of interest.

References

- Rao PSS, O'Connell K, Finnerty TK. Potential role of extracellular vesicles in the pathophysiology of drug addiction. *Mol Neurobiol* 2018;55:6906-13.
- Hors-Fraile S, Malwade S, Spachos D, Fernandez-Luque L, Su CT, Jeng WL, *et al.* A recommender system to quit smoking with mobile motivational messages: Study protocol for a randomized controlled trial. *Trials* 2018;19:618.
- U.S. Department of Health and Human Services. The health consequences of smoking—50 years of progress. A report of the Surgeon General. Atlanta: 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; 2014.
- Anastasiou E, Feinberg A, Tovar A, Gill E, Ruzmyn Vilcassim MJ, Wyka K, *et al.* Secondhand smoke exposure in public and private high-rise multiunit housing serving low-income residents in New York City prior to federal smoking ban in public housing. *Sci Total Environ* 2019;704:135322.
- Stewart BW, Kleihues P. International Agency for Research on Cancer. IARC Press. World Cancer Report; 2014. p. 82-4, 88-94.
- Almirall J, SerraPrat M, Bolibar I, Palomera E, Roig J, Hospital I, *et al.* Passive smoking at home is a risk factor for community acquired pneumonia in older adults: A population-based case-control study. *BMJ Open* 2014;4:e005133.
- Gikas A, Lambadiari V, Sotiropoulos A, Panagiotakos D, Pappas S. Prevalence of major cardiovascular risk factors and coronary heart disease in a sample of Greek adults: The Saronikos study. *Open Cardiovasc Med J.* 2016;10:69-80.
- Behrouz R, Powers CJ. Epidemiology of classical risk factors in stroke patients in the Middle East. *Eur J Neurol* 2016;23:262-9.
- Whitmer RA, Sidney S, Selby J, Johnston SC, Yaffe K. Midlife cardiovascular risk factors and risk of dementia in late life. *Neurology* 2005;64:277-81.
- Källberg H, Ding B, Padyukov L, Bengtsson C, Rönnelid J, Klareskog L, *et al.* Smoking is a major preventable risk factor for rheumatoid arthritis: Estimations of risks after various exposures to cigarette smoke. *Ann Rheum Dis* 2011;70:508-11.
- Al-kaabba AF, Saeed AA, Abdalla AM, Hassan HA, Mustafa AA. Prevalence and associated factors of cigarette smoking among medical students at King Fahad Medical City in Riyadh of Saudi Arabia. *J Family Community Med* 2011;18:8-12.
- Hansen K. Age at smoking initiation and self-rated health among second grade high school boys and girls in Scania, Sweden: A cross sectional study. *BMC Public Health* 2015;15:1143.
- Jamal A, Homa DM, O'Connor E, Babb SD, Caraballo RS, Singh T, *et al.* Current cigarette smoking among adults: United States, 2005-2014. *MMWR Morb Mortal Wkly Rep* 2015;64:1233-40.
- Al-haqwi AI, Tamim H, Asery A. Knowledge, attitude and practice of tobacco smoking by medical students in Riyadh, Saudi Arabia. *Ann Thorac Med* 2010;5:145-8.
- Moradi-Lakeh M, El Bcheraoui C, Tuffaha M, Daoud F, Al Saeedi M, Basulaiman M, *et al.* Tobacco consumption in the Kingdom of Saudi Arabia, 2013: Findings from a national survey. Health promotion and society. *BMC Public Health.* *BioMed Central* 2018;15:611.
- Hamadeh RR, Ahmed J, Jassim GA, Alqallaf SM, Al-Roomi K. Knowledge of health professional students on waterpipe tobacco smoking: Curricula implications. *BMC Med Educ* 2018;18:300.
- Elamin OE, Elamin SE, Dafalla BA, El-amin ME, Elsididg AA. Cigarette smoking among medical students in The National Ribat University, Sudan. *Sudan J Paediatr* 2013;13:45-51.
- Ansari K, Farooqi FA. Comparison and prevalence of smoking among Saudi females from different departments of the College of Applied Medical Sciences in Dammam. *Int J Health Sci (Qassim)* 2017;11:56-62.
- Al-Turki YA. Smoking habits among medical students in Central Saudi Arabia. *Saudi Med J* 2006;27:700-3.
- Wali SO. Smoking habits among medical students in western Saudi Arabia. *Saudi Med J* 2011;32:843-8.
- Almutairi KM. Prevalence of tobacco use and exposure to environmental tobacco smoke among Saudi medical students in Riyadh, Saudi Arabia. *J Community Health* 2014;39:668-73.
- Mahdi HA, Elmorsy SA, Melebari LA, Al-Masudi SM, Sharbini DA, Najjar AG, *et al.* Prevalence and intensity of smoking among healthcare workers and their attitude and behavior towards smoking cessation in the western region of Saudi Arabia. *European Network for Smoking and Tobacco Prevention.* 2018;4:30.
- Al-Mohamed HI, Amin, TT. Pattern and prevalence of

- smoking among students at King Faisal University, Al Hassa, Saudi Arabia. *East Mediterr Health J* 2010;16:56-64.
24. Morrell HE, Cohen LM, Dempsey JP. Smoking prevalence and awareness among undergraduate and health care students. *Am J Addict* 2008;17:181-6.
 25. Ficarra MG. Tobacco use prevalence, knowledge and attitudes among Italian hospital healthcare professionals. *Eur J Public Health* 2011;21:29-34.
 26. Suzuki K, Ohida T, Yokoyama E, Kaneita Y, Takemura S. Smoking among Japanese nursing students: Nationwide survey. *J Adv Nurs* 2005;49:268-75.
 27. Tamaki T, Kaneita Y, Ohida T, Yokoyama E, Osaki Y, Kanda H, *et al.* Prevalence of and factors associated with smoking among Japanese medical students. *J Epidemiol* 2010;20:339-45.
 28. Janeswar A, Kumar G, Kanungo S, Singh A, Subramanya GB, Jha K. Prevalence patterns and profile of adolescent tobacco users findings from a youth survey: A cross-sectional study. *J Family Med Prim Care* 2019;8:2017-22.
 29. Agaku IT, Odani S, King BA, Armour BS. Prevalence and correlates of secondhand smoke exposure in the home and in a vehicle among youth in the United States. *Prev Med* 2019;123:138-42.
 30. Tripathy JP. Secondhand smoke exposure at home and public places among smokers and non-smokers in India: Findings from the Global Adult Tobacco Survey 2016-17. *Environ Sci Pollut Res Int* 2019. doi: 10.1007/s11356-019-07341-x.
 31. El Amin SET. School smoking policies and health science students' use of cigarettes, shisha, and dipping tombak in Sudan. *Front Public Health* 2019;7:290.
 32. Slopen N, Kontos EZ, Ryff CD, Ayanian JZ, Albert MA, Williams DR. Psychosocial stress and cigarette smoking persistence, cessation, and relapse over 9-10 years: A prospective study of middle-aged adults in the United States. *Cancer Causes Control* 2013;24:1849-63.
 33. Nichter M, Nichter M, Carkoglu A. Reconsidering stress and smoking: A qualitative study among college students. *Tob Control* 2007;16:211-4.