

Are The Predictors of Hookah Smoking Differ From Those of Cigarette Smoking? Report of a population-based study in Shiraz, Iran, 2010

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Date of Submission: Sep 29, 2011

Date of Acceptance: Feb 15, 2012

How to cite this article: Abdollahifard G, Vakili V, Danaei M, Askarian M, Romito L, Palenik CJ. Are the predictors of hookah smoking differ from those of cigarette smoking? Report of a population-based study in Shiraz, Iran, 2010. *Int J Prev Med* 2013;4:459-66.

ABSTRACT

Background: The aim of this study was to determine the prevalence of tobacco use and effect of lifestyle factors on cigarette and hookah use among adult residents of Shiraz, Iran.

Methods: In 2010, 1,000 participants were recruited in a multistage, random sampling cross-sectional population-based survey.

Results: Response rate was 98%. Prevalence of cigarette smoking was 9.7%. Among cigarette users, 12.6% reported smoking <1 year; 13.4% smoked 1-2 years and 73.9% smoked >2 years. Almost half of those surveyed (48.9%) smoked <10 cigarettes per day (cpd); 28.4% smoked 10-15 cpd; 14.8% smoked 16-19 cpd, and 8% >20 cpd. Almost a quarter (20.4%) of the cigarette smokers tried to quit in the past year. Being male, married, aged 37-54, having higher perceived levels of stress, a non-manual occupation, and sedentary lifestyle were positively associated with cigarette smoking. Manual labor occupations, housewife/jobless status, and going frequently to restaurants were positive predictors of hookah smoking.

Conclusions: Compared to cigarettes, hookah smoking was more prevalent among Iranian adults. Approximately, the prevalence of hookah smoking in women is the same as men, whereas cigarette use was 31 times more common in men. Cigarette and hookah smoking were associated with less healthy lifestyle habits in both men and women.

Keywords: Hookah, Iran, Shiraz, tobacco

INTRODUCTION

Tobacco use in the form of cigarette smoking or hookah (ghalyan) smoking is a major public health problem worldwide. It is estimated that about one-third of all adults smoke.^[1] Around the world, one in 5 teenagers between the ages of 13 and 15, smoke cigarettes every day. Approximately, one quarter of adolescents and young adults living in East Asia and the Pacific today will die as a result of their use of tobacco.^[2]

Tobacco use is a well known risk factor for many life threatening

diseases. It is one of the top ten behaviors responsible for the whole burden of diseases globally. Tobacco use leads most commonly to diseases affecting the heart and lungs and it is a major risk factor for heart attack, strokes, chronic bronchitis, cancers of mouth, throat, voice box and pancreas, as well as a significant factor in miscarriages among pregnant smokers. Half of all long-term smokers will die of a tobacco-related condition.^[3-5]

The most commonly used form of tobacco is cigarettes. However, recently hookah smoking has become more popular in many parts of the world, including Iran.^[6] Hookah (ghalyan or ghalyoun) originated in India and then spread to Persia. It was first used by sultans, kings, war heads and war mongers to smoke opium or hashish. During the late 16th and early 17th century, it became a popular way to smoke tobacco and soon became a popular leisure activity at coffee shops. However, with the introduction of cigarettes in the last century, hookah smoking began losing popularity. Typically, hookah smokers in Iran are elderly, retired men, lorry and truck drivers, café goers and café runners. However since 1990, hookah use has increased markedly, spreading from Middle East to the other parts of the world, particularly among younger people, such as college and university students.^[7]

Water pipe (hookah, ghalyan or ghalyoun) use shares many of the same risks with cigarette smoking, plus several other unique health risks. Second-hand smoke from hookah is a mixture of tobacco smoke in addition to smoke from the burning fuel and thus poses a serious risk even for non-smokers.^[8] Furthermore, sharing a hookah mouthpiece poses a serious risk of transmission of communicable diseases, including tuberculosis and hepatitis.^[8,9]

Tobacco use has both direct and indirect economic costs. One study on the economic impact of tobacco use in the United States indicates that smoking costs approximately \$220,000 for males and \$106,000 females over a lifetime.^[10]

Recently, many developed countries have made considerable tobacco control efforts such as legal restriction and educational programs. As a result, a significant decline in the tobacco use prevalence occurred in these countries. However, in response, tobacco companies changed their target markets and shifted their attention to

developing countries, and this has led to increased tobacco use in these nations.^[1] However, sufficient data on the magnitude of tobacco use in many of these countries is lacking.^[11] In Iran, the lifelong prevalence of smoking is estimated at 20-24% and 2-4% among men and women, respectively.^[12-14] Some studies indicate an increasing trend in the use of cigarettes and other tobacco products between years 2003 to 2007.^[1] Recognition the predictors of smoking in means of either cigarette or hookah can help policy makers and health care workers to establish more efficient preventive strategies. Studies in Iran suggest age, sex and socioeconomic status, as well as close relationship with smokers in family or friend group, emotional stress and history of alcohol and illicit drug use as predictors of smoking.^[11,15] However, currently there is no reliable data concerning the actual prevalence of tobacco use and its predictor factors in Shiraz, Iran.

The aim of this study was to determine the prevalence of tobacco product use among adult residents of Shiraz, Iran. We also assessed if lifestyle-related behaviors, such as diet, leisure time, physical activity and perceived stress levels may have an effect on the use of cigarettes and hookah. This study aimed to determine whether the predictors of hookah smoking differ from those of cigarette smoking. To this end, tobacco use was correlated with demographic variables such as age, sex, marital status, educational level and occupation.

METHODS

This study involved a cross-sectional population-based survey conducted in Shiraz, Iran in 2010. Shiraz is the capital of Fars province and is the biggest city in the southern half of Iran. According to the 2000 National Census, Shiraz has a population of about 1,400,000, which makes it the sixth most populous cities in Iran.

This survey was conducted with individuals of at least 18 years of age. Persons with evidence of dementia and psychosis were excluded. Based on previous investigations, we calculated that the minimum sample size required would be 800 participants. Therefore, we recruited 1,000 participants to maintain the adequate power for the study. The gender distribution was 500 men and 500 women. Participants were considered as being

representative of the Shiraz population because we used the multistage sampling method, dividing Shiraz city into districts, and then selecting districts randomly as a first step. We then divided the districts into randomly selected blocks. Finally, dwellings on the blocks were randomly selected for participation.

Questionnaires were completed using a door to door face-to-face, interview methodology. The questionnaire underwent review by survey design experts, while the reliability was achieved using Cronbach's alpha test ($r = 0.64$). Completion of the survey implied consent. All responses were confidential. The interviewer told to participants that their participation was voluntary, yet was quite important. Socio-demographic characteristics and a limited number of lifestyle variables were selected to depict probable tobacco use among men and women in Shiraz. Socio-demographic variables included age (18-36, 37-54, 55-72, ≥ 73), gender, marital status, occupation (e.g., housewife, unemployed, non-manual, manual laborer and student), and educational level classified in terms of years of school attended.

The lifestyle-related behaviors concerning possible links to the use of hookah and cigarettes were addressed in the questionnaire. Lifetime and current smoking status were determined by asking: "Have you ever smoked?" (Yes, No), and: "Do you smoke at present? (Yes, No). The type of tobacco product used with participants was assessed by asking: "Which type of tobacco products do you use most frequently?" Responses included cigarettes, hookah, chewing tobacco and other forms. Participants were also asked: "Please define the number of cigarettes you smoke daily: Less than 9, 10 to 15, 16 to 19 and more than 20 per day." Current smokers were defined as smoking at least one cigarette per day or smoking hookah at least once per month. The definition of a past smoker included those that had stopped smoking cigarettes or hookah for at least one month.

Questions about dietary habits included: "How many servings of fruit and vegetables do you eat daily?" Four or more servings per day were considered as ideal.^[16] Also asked was "How often do you go to cafes or restaurants?"

Leisure time physical activity was assessed by asking: "How many times do you have leisure physical activity for at least 30min in a given week?" Responses were categorized as ≥ 3 times/

week and < 3 times/week.^[17] Data on perceived stress level was obtained by asking: "Do you experience sufficient emotional stress that prevents you from conducting daily activities?"

To determine the predictors of tobacco product used, we applied the multivariable logistic regression analyses using the SPSS, Version 16. We also used chi-square and t-tests to assess the correlation of the demographic and lifestyle factors to tobacco products used. Statistical significance was set at $P < 0.05$.

RESULTS

One thousand (500 men and 500 women) selected individuals completed the questionnaire. Socio-demographic characteristics of the participants are shown in Table 1. Initially 1,020 people were asked to achieve 1,000 participants. As a matter of fact, the response rate of this survey was very high, about 98%. Table 2 compares socio-demographic and lifestyle characteristics of the study population to their smoking status. Overall prevalence of cigarette smoking among the participants of this study was 9.7% (18.4% for men and 1.0% among women). However, 11.9% of all participants used hookah (13.6% for men and 10.6% among women), 0.1% used chewing tobacco and 1.5% used other forms of tobacco. Among cigarette smokers, 12.6% reported the history of smoking for less than one year, 13.4% mentioned the duration of their smoking was between one to two years, while 73.9% had smoked for more than two years. Almost half (48.9%) smoked less than 10 cigarettes per day. 28.4% smoked 10 to 15 cigarettes per day, 14.8% smoked 16 to 19 cigarette per day, and 8% more than 20 cigarettes per day. Almost a quarter (20.4%) of smokers tried to quit cigarette use during the last 12 months.

Results of the Chi-square test indicated significant differences existed for cigarette smoking based on the subgroups of sex, age, marital status, occupation and physical activity level. Hookah smoking was correlated to occupation and eating in a restaurant. Smoking more than 9 cigarettes a day was associated with gender and marital status. There was a significant difference for making an effort to quit smoking based on the subgroups of emotional stress. [Table 2]

Multivariate analyses performed adjusted for socio-demographic variables in addition to other

Table 1: Socio-demographic and lifestyle characteristic of the study population, Shiraz, Iran, 2010

Characteristic of participants	Female (n = 500)	Male (n = 500)	P-value	Total (n = 1000)
Age				
mean± SD	38.9± 14.1	39.1± 16.4	0.887	39.0± 1.5
18-36(%)	235 (46.9%)	248 (49.5%)	.039	241 (48.2%)
37-54(%)	188 (37.7%)	154 (30.9%)		172 (34.3%)
55-72(%)	69 (13.8%)	80 (16.0%)		74 (14.9%)
≥73 (%)	8 (1.6%)	18 (3.6%)		13 (2.6%)
Marital status (%)				
Single	153 (30.6%)	191 (38.2%)	.011	172 (34.4%)
Married	347 (69.4%)	309 (61.8%)		328 (65.6%)
Education (%)				
≤5 years	116 (23.2%)	69 (13.8%)	<.001	93 (18.5%)
6-12 years	235 (47.0%)	224 (44.8%)		229 (45.9%)
13-16 years	128 (25.6%)	175 (35.0%)		152 (30.3%)
≥17 years	21 (4.2%)	32 (6.4%)		26 (5.3%)
Occupation (%)				
Jobless/housewife	358 (71.6%)	88 (17.6%)	<.001	223 (44.6%)
Non-manual	49 (9.8%)	116 (23.2%)		82 (16.5%)
Manual	44 (8.8%)	238 (47.6%)		141 (28.2%)
Student	49 (9.8%)	58 (11.6%)		54 (10.7%)
Current smoker (%)	5 (1.0%)	92 (18.4%)		49 (9.7%)
Past smoker	2 (.4%)	34 (6.8%)		19 (3.8%)
Leisure time physical activity (%)				
<3 times/week	357 (71.4%)	324 (64.8%)	.025	341 (68.1%)
≥3 times/week	143 (28.6%)	176 (35.2%)		159 (31.9%)
Fruit and vegetable consumption (%)				
<4 unit/day	357 (71.4%)	403 (80.6%)	.001	380 (76.0%)
≥4 unit/day	143 (28.6%)	97 (19.4%)		120 (24.0%)
Go to restaurant or cafe (%)				
>2 times/month	132 (26.4%)	174 (34.8%)	.004	153 (30.6%)
≤2 times/month	368 (73.6%)	326 (65.2%)		347 (69.4%)
Emotional stress (%)				
High	319 (63.7%)	182 (36.3%)	<.001	332 (66.4%)
Low	181 (36.3%)	318 (63.7%)		168 (33.6%)

Table 2: Socio-demographic and lifestyle characteristic of the study population according to smoking status, Shiraz, Iran, 2010

	Cigarette smoking		Hookah smoking		Smoke ≥10 cigarette/day		Tried to Quit in last 12 months	
	%	P-value	%	P-value	%	P-value	%	P-value
Sex								
Male	18.4	<0.001	13.2	0.204	53.6	0.036	91.5	0.595
Female	1.0		10.6		0.0		85.7	
Age								
18- 36	5.2	<0.001	11.4	0.237	38.1	0.190	89.7	0.474
37-54	14.3		12.9		53.8		90.0	
55-72	14.1		13.4		61.5		97.6	
≥73	7.7		0.0		0.0		90.0	

(Continued)

Table 2: Continued

Characteristic of participants	Cigarette smoking		Hookah smoking		Smoke ≥ 10 cigarette/day		Tried to Quit in last 12 months	
	%	P-value	%	P-value	%	P-value	%	P-value
Marital status								
Single	4.9	<0.001	11.6	0.847	23.1	0.028	89.1	0.453
Married	12.2		12.0		23.1		92.2	
Educational level								
≤ 5 years	11.4	0.371	11.9	0.839	52.9	0.958	89.7	0.969
6-12 years	10.7		12.6		52.4		90.8	
13-16 years	7.3		10.6		50.0		92.2	
≥ 17 years	9.4		13.2		40.0		92.9	
Occupation								
Jobless/housewife	3.4	<0.001	11.9	0.029	50.0	0.923	94.7	0.313
Non-manual	13.3		7.3		47.6		92.5	
Manual	21.3		16.0		52.6		90.9	
Student	0.0		8.4		0.0		78.6	
Physical activity								
<3 times/week	12.0	<0.001	12.5	0.407	54.7	0.112	36.7	0.805
≥ 3 times/week	4.7		10.7		30.8		34.2	
Fruit and vegetable consumption								
<4 unit/day	10.7	0.069	11.3	0.310	54.8	0.130	35.1	0.834
≥ 4 unit/day	6.7		13.8		33.3		25.7	
Go to restaurant or cafe (%)								
<2 times/month	9.5	0.760	9.4	<0.001	51.6	0.890	34.4	0.733
≥ 2 times/month	10.1		17.6		50.0		37.8	
Emotional stress								
High	90.5	0.750	88.1	0.997	83.3	0.087		0.015
Low	89.9		88.1		67.6			

lifestyle variables. Using this model, being male, having a high perceived level of emotional stress, and having a sedentary lifestyle were positively associated with cigarette smoking. Persons with history of high emotional stress smoked 2.1 times more than those with lower reported stress levels. People who did not exercise regularly smoked three times more cigarettes than those who did. Men were 31 times more likely to smoke than were women.

Manual labor occupations and going frequently to restaurants were positive predictors of hookah smoking. Hookah smoking was 2.1, 1.1 and 2.7 times greater in the jobless, housewives, and non-manual and manual job holders than in students. Only marital status was a predictor for smoking more than 10 cigarettes per day. Married men and women smoked 4.2 times greater than single persons. Gender was associated with making an

effort to quit cigarette smoking. In the past 12 months, women tried to quit 12.8 times more than men [Table 3].

DISCUSSION

Over the past 30 years, considerable tobacco control efforts have been made. However, cigarette smoking remains a major preventable cause of morbidity and mortality throughout the world.^[18]

In Iran, cigarette smoking remains an unacceptable social practice. Most families strictly prohibit their adolescent children from smoking. On the other hand, smoking among Iranian men usually begins before the age of 20.^[19] One study which tested blood cotinine levels to validate self-report smoking levels revealed that approximately 10.6% and 14.6% of teenage children who declared

Table 3: Predictors of tobacco product use, Shiraz, Iran, 2010

Tobacco product use	Predictor	B	S.E.	P-value	Exp(β)	95.0% C.I. for EXP(β)	
						Lower	Upper
Cigarette smoking	High stress level	0.788	0.254	0.002	2.199	1.337	3.616
	Sedentary lifestyle	1.106	0.311	<0.001	3.023	1.643	5.565
	Male	3.441	0.545	<0.001	31.226	10.735	90.824
	Constant	-40.217	2.661E4	0.999	<0.001		
R ² :0.349							
Hookah smoking	Outdoor eating Occupation*	0.826	0.206	<0.001	2.285	1.525	3.424
	Jobless/housewife	0.742	0.391	0.058	2.100	0.976	4.516
	Non-manual	0.106	0.466	0.819	1.112	0.446	2.774
	Manual	0.978	0.392	0.013	2.660	1.234	5.735
	Constant	-2.968	0.385	<0.001	0.051		
R ² : 0.470							
Smoke ≥ 10 cigarette/day	Married	1.445	0.698	0.038	4.242	1.080	16.669
	Constant	-1.204	0.658	0.067	0.300		
R ² :0.074							
Try to Quit in last 12 month	Female	2.552	1.103	0.021	12.828	1.476	111.501
	Constant	-0.760	0.225	0.001	0.468		
R ² :0.109							

Reference category: *student

themselves to be nonsmokers were actually currently smoking.^[20]

This study assessed the prevalence of tobacco use among a representative sample of adults living in Shiraz. Associations of selected lifestyle-related and socio-demographic factors with both hookah and cigarette smoking could be made. There were more current smokers than former smokers in this study. Smoking prevalence was higher for men than women. Smoking prevalence was highest in the 37-54 years old age group and the lowest among participants between 18 and 36 years of age. This result suggests that the prohibitory role performed by parents concerning smoking among adolescents was having an effect.

Smoking prevalence and the amount of cigarettes smoked daily was higher for married persons than for single individuals. Perhaps family responsibilities and social and communication problems resulted in higher levels of perceived emotional stress. On the other hand, the percentage of smokers who had quit was higher among women than men, and women are more likely than men to try to quit smoking. This difference remained even after adjustment for demographic differences. Men and married persons are more likely to be heavy smokers (10 or more cigarettes per day).

The results of this survey suggested that cigarette and hookah smoking was associated with less healthy lifestyle habits, in both men and women. Higher perceived stress levels and less leisure time physical activity were associated with increased cigarette smoking. One study in Sweden revealed that female ex-smokers experience lower levels of work-related emotional stress and they spent more time in smoke free environments.^[21] Emotional stress can threaten human health status through different mechanisms, directly affecting health due to disruption in biological pathways. However, people may choose unhealthy lifestyle habits, such as smoking, in order to cope with daily life stresses.^[22] Unhealthy lifestyle-related factors, such as high stress levels often occur among young college and university students near final exams. In addition, smoking family members, poor dietary habits, and above all, lack of free leisure time physical activity, appear to be risk factors for tobacco use in a variety of people.^[23]

Hookah use was similar between men and women, yet there was such a large difference when it came to cigarette smoking. This finding is reasonable because in Iranian society female adolescents encounter more limitations in cigarette

smoking. However, hookah smoking is a custom and traditional source of entertainment for many families; as a matter of fact, female adolescents can experience hookah use more easily as a leisure time activity in family gatherings and peer groups both indoors and outdoors.^[19]

A Beirut survey indicated that hookah smoking was more prevalent among male college students who had increased episodes of binge alcohol abuse.^[24] Another study of 72 local government areas in Egypt (6,950 individuals) indicated that abdominal obesity was more prevalent among hookah smokers than nonsmokers.^[25] In the present study, being jobless, a housewife, and going to restaurants and cafes more frequently correlated with higher prevalence of smoking hookah. These differences remained even after adjustment for demographic differences, which supported previous studies indicating that smoking may co-occur with other unhealthy behaviors.^[26] Other researchers have shown that unhealthy lifestyle habits, such as lower levels of physical activity and consuming less healthy foods were more common among smokers.^[27]

In this study, there was not sufficient evidence to support any association between gender, age and even educational class and hookah smoking. These findings justify the popularity and use of hookah as a custom in Iranian society, and also indicate a more acceptable attitude about hookah smoking than cigarette use. Many people believed that hookah smoking is safer and healthier than cigarette smoking and recommended it to their friends and family. Spending more time in restaurants and cafes was a predictor of hookah smoking in both men and women. Recently, spending leisure time smoking hookah in cafes and restaurant has become more popular in Iran. Water pipe (ghalyan) tobacco is often sweetened and flavored, making it appealing. The sweet smell and taste of the smoke may explain why some people, particularly young people who otherwise would not use tobacco, begin to use hookah.

We believe that the major reasons for the growing popularity of hookah use are the flavored tobacco mix, the introduction and establishment of more attractive cafes, and restaurants, aggressive marketing, and a vast mass media and advertisement campaign aimed at college and university students. In addition, packaging and displays which come

in a variety of colorful, finely crafted hookah or cigarette boxes, may attract potential users.

This study had some limitations. When the interviewers asked about lifestyle habits, the chance of recall bias may have been present. Also, interviewer's bias can occur. On the other hand, there is a desire to be perfect and have an acceptable image in the society for every person and it may lead to social desirability bias when participants responded to these kinds of questions. Therefore, under-reporting of tobacco product use is possible. Finally, we were limited in assessing all the potential sociodemographic and lifestyle factors related to tobacco use and this could lead to reduced power of the study.

CONCLUSION

This study introduces important practical information to policy makers to design tailor preventive interventions that suit target population. There was a worrying picture in hookah smoking popularity among shirazi population specially shirazi women. On the other hand, it was obvious that smoking habit was consistent with other unhealthy behaviors. The authors believe that such studies warrant replication in other settings and populations in Iran and other developing countries.

ACKNOWLEDGEMENTS

The authors would like to thank Miss Zahra Bagheri, due to her contribution in statistical analysis. This study was funded by Shiraz University of medical sciences.

REFERENCES

1. Amin-Esmaili RM, Rahimi-Movaghar A, Sahimi-lzadian E, *et al.* The prevalence of Smoking among Iranian middle school students a systematic review. *Iran J Psychiatry* 2007;2:157-64.
2. Meysamie A, Ghaletaki R, Haghazali M, Asgari F, Rashidi A, Khalilzadeh O, *et al.* Pattern of tobacco use among the Iranian adult population: results of the national Survey of Risk Factors of NonCommunicable Diseases (SURFNCD-2007). *Tob Control* 2010;19:125-8.
3. French SA, Hennrikus DJ, Jeffery RW. Smoking status, dietary intake, and physical activity in a sample of working adults. *Health Psychol* 1996;15:448-54.
4. Mackay J. The global tobacco epidemic. The next 25 years. *Public Health Rep* 1998;113:14-21.
5. Weiss JW, Mouttapa M, Chou CP, Nezami E, Anderson Johnson C, Palmer PH, *et al.* Hostility, depressive

- symptoms, and smoking in early adolescence. *J Adolesc* 2005;28:49-62.
6. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 Years observations On male British doctors. *BMJ* 2004;328:1519.
 7. Giovino GA. The tobacco epidemic in the United States. *Am J PreMed* 2007;33(6 Suppl):S318-26.
 8. The BACCHUS Network. Saving lives since 1975. Reducing Hookah Use: Public Health Challenge for the 21st Century. Available from: <http://womenshealth.gov/health-topics/a-z-topic/details.cfm?pid=14934> [Last accessed 2011 Aug 24.]
 9. Rivero LR, Persson JL, Romine DC, Taylor JT, Toole TC, Trollman CJ, *et al.* Towards the world ban of indoor cigarette smoking in public places. *Int J Hyg Environ Health* 2006;209:1-14.
 10. Lang RS, Hensrud DD. Clinical preventive medicine. 2nd ed. American Medical Association. United States of America: AMA press; 2004. p. 138
 11. Mohammadpoorasl A, Fakhari A, Shamsipour M, Rostami F, Rashidian H. Transitions between the stages of smoking in Iranian adolescents. *Prev Med* 2011;52:136-8.
 12. WHO study Group on Tobacco Product Regulation (TobReg). Waterpipe, tobacco Smoking: Health effects, research needs and recommended actions by regulators. World Health Organization. Geneva (Switzerland): Tobacco Free Initiative; 2005. p. 1-7.
 13. Quist-Paulsen P. Cessation in the use of tobacco-pharmacologic and non-pharmacologic routines in patients. *Clin Respir J* 2008;2:4-10.
 14. Greenlund KJ, Liu K, Knox S, McCreath H, Dyer AR, Gardin J. Psychosocial work characteristics and cardiovascular disease risk factors in young adults: The CARDIA study. Coronary artery risk disease in young adults. *Soc Sci Med* 1995;41:717-23.
 16. Maziak W. The waterpipe: Time for action. *Addiction* 2008;103:1763-7.
 15. Tamim H, Terro A, Kassem H, Ghazi A, Khamis TA, Hay MM, *et al.* Tobacco use by university students, Lebanon, 2001. *Addiction* 2003;98:933-9.
 17. McCaffery JM, Papandonatos GD, Lyons MJ, Koenen KC, Tsuang MT, Niaura R. Educational attainment, smoking initiation and lifetime nicotine dependence among male Vietnamese twins. *Psychol Med* 2008;38: 1287-97.
 18. Fotouhi A, Khabazkhoob M, Hashemi H, Mohammad K. The prevalence of cigarette smoking in residents of Tehran. *Arch Iran Med* 2009;12:358-64.
 19. Kelishadi R, Sadry G, Zadehan NS, Hashemipour M, Sabet B, Bashardoust N, *et al.* Smoking, Adolescents and Health: Isfahan Healthy Heart Program-Heart Health Promotion from childhood. *Asia Pac J Public Health* 2004;16: 15-22.
 20. Sarraf-Zadegan N, Boshtam M, Shahrokhi S, Naderi GA, Asgary S, Shahparian M, *et al.* Tobacco use among Iranian men, women and adolescents. *Eur J Public Health* 2004;14:76-8.
 21. World Health Organization. Smoking Statistics. Fact sheet. Available from: <http://www.wpro.who.int/media-Centre/fact-sheets/fs-20020528.htm> [Last accessed 2011 Aug 24].
 22. Global Youth Tobacco Survey Collaborative. Tobacco use among youth: A cross-country Comparison. *Tobacco Control* 2002;11:252-70.
 23. WHO Report on the Global Tobacco Epidemic: The MPOWER package. 2008. Geneva: WHO. 14-21. Available from: http://www.who.int/tobacco/mpower/mpower_report_full_2008.pdf [last accessed 2013 Apr 21].
 24. Casagrande SS, Wang Y, Anderson C, Gary TL. Have Americans increased their fruit and vegetable intake? The trends between 1988 and 2002. *Am J Prev Med* 2007;32:257-63.
 25. WHO Regional Office for the Eastern Mediterranean. (2006). Tobacco use in shisha: Studies on waterpipe smoking in Egypt. World Health Organization: Egyptian Smoking Prevention Research Institute. Available from: <http://www.emro.who.int/dsaf/dsa746.pdf> [Last accessed 2011 Aug 24].
 26. Larson NI, Story M, Perry CL, Neumark-Sztainer D, Hannan PJ. Are diet and physical activity patterns related to cigarette smoking in adolescents? Findings from project EAT. *Prev Chronic Dis* 2007;4:A51.
 27. Kelishadi R, Mokhtari MR, Tavasoli AA, Khosravi A, Ahangar-Nazari I, Sabet B, *et al.* Determinant of tobacco use among youths in Isfahan, Iran. *Int J Public Health* 2007;52:173-9.

Source of Support: Nil, **Conflict of Interest:** None declared.