RESEARCH ARTICLE

Smoking and Associated Factors Among the Population Aged 40-64 in Shahroud, Iran

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Abstract

Background: Smoking is known as a major risk factor for different types of cancer, as well as cardiovascular disease. Its prevalence is increasing in developing countries. The aims of this study were to determine the prevalence of smoking and its associated factors among the population aged 40-64 years in the city of Shahroud which is a representative urban population in Iran. Materials and Methods: A cross-sectional population-based study with stratified random cluster sampling was conducted in 2009 as the first phase of Shahroud Eye Cohort Study. Of 6,311 people, 5,190 participated (82.2%). Information about smoking habit was obtained by face-to-face interview. Results: The overall prevalence of current tobacco smoking was 11.3% (95%CI: 10.5-12.3). It was significantly higher among males than females (25.7% and 0.71%, P<0.001). The prevalence of current cigarette smoking was 10.8% and 1.75% were past smokers. The smoking rate of water-pipe was 0.67%. Unemployed people smoked more than employed (OR=2.66, 95%CI: 1.38-5.14). Conclusions: The prevalence of smoking is low in Shahroud compared with other parts of Iran and other countries. Age, sex, job and marital status were associated with smoking. The low smoking rate among women may be attributed to cultural and social reasons.

Keywords: Prevalence - smoking - tobacco - urban Iran - health survey

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Introduction

In 2008, Non-Communicable Diseases (NCDs) was account for 63% of a total of 57 million deaths globally. Out of the figure, 36 millions were attributed to cardiovascular diseases, diabetes, cancers and chronic respiratory diseases (WHO, 2011). Smoking is known as one of the main risk factors of cardiovascular diseases (Ezzati et al., 2005; Norum, 2005; WHO, 2011; Eriksen et al., 2012).

World Health Organization (WHO) has estimated that about 6 million people die annually from smoking. If current mortality trends continue, it will rise to more than 8 million deaths per year by 2030 (WHO, 2011b). Such deaths are more prevalence in male (15%) than female (7%) (Al Riyami and Afifi, 2004; Ezzati et al., 2005). Approximately three-quarters of all these deaths will happen in developing countries (Gilbert et al., 2004; Finch et al., 2010).

There are about one billion smokers in the world according to WHO statistics in 2008 (WHO, 2011) Prevalence of smoking is on the rise in many developing countries whereas it has been decreasing in most developed countries (Youssef et al., 2002; Eriksen et al., 2012) Smoking rate in Western Europe decreased by 26% from 1990-2009. On the contrast, cigarette smoking has increased by 57% during the same time in the Middle East and Africa (Eriksen et al., 2012) A recent cohort study showed that the relative risk for death from all causes among current smokers, compared with never smokers, were 2.80 for male smokers and 2.76 for female smokers (Thun et al., 2013).

Several studies were conducted to estimate the prevalence of smoking in Iran (Mohammad et al., 2001; Sarraf-Zadegan et al., 2004; Fotouhi et al., 2009; Meysamie et al., 2010; WHO, 2011; 2011b; 2012; CDC, 2012). According to Iranian National Health and Diseases Survey, the prevalence of smoking has been decreased

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from 14.6% in 1991 to 11.7% in 1999 (Mohammad et al., 2001). Based on WHO report in the Global Tobacco Epidemic in 2009 (WHO, 2011b), the prevalence of current smoking was 11.8% (22.1% among male and 1.3% among female) for age group 15-64 years in Iran.

Over the past 50 years, the results of cohort studies showed that middle-aged people with two or more major risk factors had radically higher risks for cardiovascular death, myocardial infarction and stroke across their life. The study reported that decrease in smoking and cholesterol levels have influenced to decline in cardiovascular disease rates over the past several decades and it reflects changes in the prevalence of the risk factors rather than access to and effects of treatment. Researchers also found similar trends across all races and age groups (Berry et al., 2012). It is deemed necessary to have overview of present situation among this age group to prevent tobacco-related risks. The aim of this study was to determine the prevalence of smoking among people aged 40-64 years in the population of Shahroud, Iran. Shahroud is representative for urban population of Iran.

Materials and Methods

This cross-sectional population-based study is the first phase of Shahroud Eye Cohort Study. Shahroud has stable population and good Primary Health Care (PHC) system for running the prospective study. According to the 2006 census; the population of Shahroud was 133,835. Out of them, about 28,000 people were aged 40-64.

Target population in this study was Shahroud inhabitants between the ages of 40 and 64 years. A multistage stratified cluster sampling method was used to select randomly the survey sample from the Shahroud population. Since the population of Shahroud is covered by 9 health centers in the Iranian Primary Health Care system, each center was considered as a stratum and the number of the clusters was calculated proportionate to the population of each center. The electronic databases of the health centers provided the sampling frame (complete listing of all households) for each stratum. Three hundred clusters were selected, each cluster consisting of sufficient number of households to provide a total of at least 20 eligible persons. The households were visited based on a determined plan. The index households for each cluster were selected randomly. After identification of the index household in each cluster, the enumeration of the neighboring households continued from the right side of that household in the cluster until at least 20 eligible individuals were found.

The questionnaire was developed and approved for use by experts. The questionnaire consisted of two parts; the first part covered the demographic characteristics of surveyed households (date of birth, gender, marital status, education and occupation). The second part interviewed about smoking (status, frequency, type, duration and the age of starting smoking). The Information about smoking habit was obtained by a face-to-face interview. This study data were collected on two types of smoking cigarette and water-pipe. The protocol of this study which is published previously (Fotouhi et al., 2013) has been approved by the ethics committee of the Shahroud University of Medical Sciences. Written informed consent was obtained from all participants.

Data were analyzed using Epi-info, version 7 and SPSS, version 19.0. Smoking rates are showed with 95% confidence intervals (CIs) for current smokers; the cluster sampling design was applied. The means of variables were presented with standard deviation (SD). Univariate and multivariate logistic regression were performed to see the association between smoking and background variables. Odds ratios (ORs) with 95% confidence intervals (CIs) were used for comparison, $P<0.05$ was considered statistically significant.

Results

A total of 6,311 people aged 40-64 years were sampled in 2009. Among them 5,190 people participated in the study with a response-rate of 82.24%. The mean age of the studied population was 50.92 (±6.25) years. Of the total participants, 26.78% were 45-49 years; 57.36% were female; 50.00% had primary education; 51.48% were housekeepers; 92.41% were married.

Table 1 summarizes the current use of cigarette and water-pipe among interviewed participants. The overall smoking rate was 11.33% (95%CI: 10.45-12.27), the rate of prevalence was higher in male 25.70% (95% CI: 23.74-27.66) than in female 0.71% (95%CI: 0.40-1.01), ($P<0.001$). The peaked prevalence of smoking was observed among unemployed people (41.51%). The prevalence of current cigarette smoking was 10.79% (95%CI: 9.90-11.68), 24.90% (95%CI: 22.97-26.86) for male and 0.30% (95%CI: 0.11-0.50) among female. The highest prevalence of current cigarette smoking was in unemployed respondents (37.74%). The prevalence of smoking increased from 5.39% in illiterate people to 14.23% in college educated people. In total, the prevalence of current water-pipe users was 0.67% (95%CI: 0.44-0.90), male had higher rates of current water-pipe smoking than female 1.04% (95%CI: 0.63-1.45) versus 0.40% (95%CI: 0.16-0.63), ($P=0.006$).

The prevalence of past smokers was 1.75%. It was significantly higher in male than in female ($P<0.001$) and increased with age from 0.52% in the age group of 40-44 to 2.66% in the age group of 60-64 ($P=0.005$).

The overall mean age of starting to smoke was 25.06 (±10.57) years, 25.84 (±9.25) years in male and 29.33 (±10.63) years in female. Between the ages 40-64 years, smoking was initiated at similar ages. The mean number of cigarettes was smoked in a day among current smokers 11.89 (±8.38). The highest number of cigarettes was smoked by participants aged 55-64, 13.16 (±8.84).

Multivariate logistic regression analysis was used to determine the association between smoking and sex, age, education, occupation and marital status. Smoking was considered as dependent variable. The odds of smoking among the unemployed were 2.66 times (95%CI 1.38-5.14) greater than employed peoples. People with college education had a more than two-fold increase of the odds of smoking compared to illiterate people (OR=2.40, 95%CI 52-3.76) in univariate logistic regression model,

Table 1. The Prevalence of Current Smoking According to Different Demographic Characteristics in Shahroud, Iran; 2009

Variables		No.	Current cigarette smoking (%) Prevalence (95% CI*)	Current water- pipe smoking (%) Prevalence (95% CI)	Overall current smoking (%) Prevalence (95% CI)
Age	40-44	960	7.81 (5.96-9.67)	0.52 (0.07-0.97)	8.23 (6.31-10.15)
	45-49	1390	10.36 (8.61- 12.12)	0.58 (0.18-0.97)	10.82 (9.05-12.6)
	50-54	1285	13.23 (11.37-15.09)	0.62 (0.20-1.05)	13.79 (11.9-15.67)
	55-59	954	11.85 (9.68-14.01)	0.84 (0.26-1.41)	12.68 (10.47-14.90)
	60-64	601	9.65 (7.33-11.97)	1.00 (0.21-1.78)	10.33 (7.95-12.72)
Gender	Female	2977	0.30 (0.11-0..50)	0.40 (0.16-0.65)	0.71 (0.40-1.01)
	Male	2213	24.90 (22.97-26.82)	1.04 (0.63-1.45)	25.70 (23.74-27.66)
Education	Illiterate	427	5.39 (3.36-7.42)	1.17 (0.004-3.25)	6.57 (4.30-8.84)
	Primary school	2595	10.02 (8.71-11.33)	0.81 (0.46-1.16)	10.72 (9.39-12.05)
	Guidance	481	13.51 (10.51-16.51)	0.21 (0.001-0.014)	13.72 (10.70-16.75)
	High school	1146	11.78 (9.93-13.63)	0.44 (0.06-0.81)	12.16 (10.33-14.00)
	College	541	14.23 (11.29-17.17)	0.56 (0.002-0.017)	14.42 (11.44-17.40)
Job	Employed	1114	19.57 (17.06-22.08)	0.72 (0.22-1.21)	20.14 (17.61-22.68)
	Retired	853	20.75 (17.92-23.58)	0.35 (0.11-0.83)	21.00 (18.13-23.84)
	Unemployed	53	37.74 (24.00-51.47)	3.77 (0.95-13.80)	41.51 (29.04-55.98)
	Disabled	45	20.00 (7.61-32.39)	0	20.00 (7.61-32.39)
	House keeper	2672	0.26 (0.02-0.43)	0.45 (0.18-0.72)	0.67 (0.34-1.01)
	Others	453	28.70 (24.33-33.06)	2.21 (0.91-3.50)	30.38 (25.97-34.78)
Marital Status	Single	67	8.96 (1.64-16.28)	0	8.96 (1.64-16.28)
	Married	4796	11.45 (10.51-12.39)	0.63 (0.40-0.85)	11.96 (11.00-12.92)
	Widow	291	1.03 (0.34-3.11)	1.72 (0.24-3.19)	2.75 (0.92-4.58)
	Divorced	36	5.57 (0.014-0.194)	0	5.56 (0.014-0.194)
Total		5190	10.79 (9.90-11.68)	0.67 (0.44-0.91)	11.33 (10.45-12.27)

*CI=Confidence Interval

Table 2. Predictors of Smoking Among Middle Aged Population of Shahroud, Iran; 2009

Variables	Univariate Logistic Regression		Multivariate Logistic Regression	
	Odds ratio (95% CI*)	P value	Odds ratio (95% CI*)	P value
Sex				
Female	1		1	
Male	48.64 (31.05-76.20)	<0.001	16.22 (9.50-27.69)	<0.001
Age				
40-44	1		1	
45-49	1.35 (1.02 -1.80)	0.038	1.13 (0.83-1.54)	0.435
50-54	1.78 (1.34-2.36)	<0.001	1.38 (1.02-1.86)	0.040
55-59	1.62 (1.20-2.18)	0.002	1.07 (0.76-1.51)	0.702
60-64	1.29 (0.91-1.82)	0.159	0.79 (0.52-1.19)	0.252
Education				
Illiterate	1		1	
Primary school	1.71 (1.14-2.55)	0.009	1.05 (0.66-1.69)	0.829
Guidance	2.26 (1.42-3.59)	0.001	1.09 (0.63-1.89)	0.761
High school	1.97 (1.29-3.00)	0.002	0.94 (0.57-1.54)	0.799
College	2.40 (1.52-3.76)	<0.001	0.71 (0.42-1.22)	0.217
Job				
Employed	1		1	
Retired	1.05 (0.84-1.31)	0.647	1.18 (0.90-1.55)	0.223
Unemployed	2.81 (1.60-4.95)	<0.001	2.66 (1.38-5.14)	0.004
Disabled	0.99 (0.47-2.09)	0.981	1.26 (0.54-2.90)	0.592
House keeper	0.03 (0.02-0.04)	<0.001	0.19 (0.10-0.36)	<0.001
Others	1.73 (1.35-2.22)	<0.001	1.62 (1.24-2.12)	0.001
Marital Status				
Single	1		1	
Married	1.38 (0.60-3.21)	0.453	1.77 (0.69-4.51)	0.232
Widow	0.29 (0.10-0.86)	0.025	5.25 (1.53-17.98)	0.009
Divorced	0.60 (0.11-3.13)	0.542	2.36 (0.36-15.50)	0.370

*CI= Confidence Interval

but in multivariate model this association was not significant(Table 2).

Male gender, Housekeeper job and being widow were the other important variables which had significant association to smoking.

Table 3. Comparison of The Prevalence of Smoking with some Developed and Developing Countries.

	Age (years)	Male	Female	Total	Year of survey
Country					
Iraq	≥12	26.5	2.9	14.8	2007
Bahrain	20-64	33.4	7	19.9	2007
Kuwait	20-64	42.3	4.4	23.6	2006
Egypt	≥15	37.6	0.5	19.4	2009
UAE	≥18	28.1	2.4	20.5	2003
Pakistan	≥18	32.4	5.7	19.1	2002-2003
Turkey	≥15	47.9	15.2	31.2	2009
China	≥15	52.9	2.4	28.1	2009
India	≥15	24.3	2.9	14	2009
Thailand	≥15	45.6	3.1	23.7	2009
Malaysia	≥18	46.4	1.6	21.5	2006
Japan	≥20	38.2	10.9	23.4	2009
Australia	≥14	18	15.2	16.6	2007
USA	≥15	31.2	23	27	2009
New Zealand	≥15	21.1	18.8	19.9	2007
Italy	≥11	29.5	17	23	2009
Germany	≥15	30.5	21.2	25.7	2009
France	12-75	33.3	26.5	29.9	2005
Canada	≥15	23	16	19.5	2009
Iran	15-64	22.1	1.3	11.8	2009

Discussion

According to the result of our survey, the prevalence of current cigarette smoking in Shahroud was 10.8% (24.9% male and 0.3% female). In 2003, Fotouhi et al. (2009) in Tehran reported prevalence of smoking among people aged over 15 years was 11.9% (20.6% male and

2.9% female); while according to another study among people aged 15-69, it was 14.6% (27.2% male and 3.4% female) in 1991 and 11.7% (24.0% male and 1.5% female) in 1999 (Mohammad et al., 2001). In 2007, Meyasamie et al. (2010) found smoking prevalence of 12.5% (23.4% male and 1.4% female) among population aged 15-64 years. Most of previous studies in Iran found higher results than our findings. We assume our lower end of overall prevalence contributed by low cigarette smoking rate among female. Table 3 compares the prevalence of smoking in Iran with other countries according to their prevalence in sex, age groups, location and year of study (WHO, 2011b).

The prevalence of cigarette smoking among female in our study is the lowest among the Eastern Mediterranean countries (Youssef et al., 2002; Khattab et al., 2012). In many countries around the world, the ratio of cigarette smoking among people aged 15 years old and older for female compared to male is higher than one to ten (Eriksen et al., 2012). Similar ratio has been reported from age group 16-69 in Iran (Mohammad et al., 2001). However, the ratio in our study was one to eighty. Previous study of Egyptian smoking aged 18 year and older reported similar finding (WHO, 2011b). This ratio seems low compared to other countries where in female to male ratio were one to 7.14 (Pakistan), one to 1.25 (United State), one to 1.17 (Australia), one to 1.04 (United Kingdom) (Nasir and Rehan, 2001). This low prevalence of smoking may due to social reasons or religion binding that discourage smoking in female. Similar finding concerning gender gap in the prevalence of smoking was reported in the Eastern Mediterranean countries (Nasir and Rehan, 2001; Youssef et al, 2002; Al Riyami and Afifi, 2004; WHO, 2011b; Khattab et al., 2012). This scenario was proven by a study carried out in Iran, whereby self-reported cigarette prevalence in male and female aged 19 to 49 years old was 19.4% and 1.5%, respectively. In the same sample population, the prevalence increased to 21.2% and 6.7%, respectively, when tested by serum continine level as indicator of nicotine metabolism among smokers (Sarraf-Zadegan et al., 2004).

The highest ranked smoking rate was in the age group of 50-54 years old and the second highest rate was among the age group of 55-59 years old. This could be explained by relevant studies that found these specific ages representing the previous generations, who started their smoking habit 25-34 years ago during the beginning of smoking epidemic in developing world where there was insufficient public awareness regarding harmful effects of smoking (Youssef et al., 2002).

In this study, education had no role on cigarette smoking. However, majority of studies in developing countries reported tobacco use was the highest among those with lowest levels of education (Nasir and Rehan, 2001; Rani et al., 2003; Al Riyami and Afifi, 2004; Al Turki et al., 2010; Hosseinpoor et al., 2011).

Unemployed people had highest smoking rate. De Vogli et al. (2005) revealed that jobless has negative direct and indirect effect to smoking habit. Another study also reported smoking is a way to relieve life-related stresses, such as jobless (Jarvis and Wardle, 2005).

The prevalence of past smokers was increased by age. Those who smoke for many years often start to experience physical symptoms of smoking-related diseases at the age of our studied group. In many occasions, smokers from the higher age group are forced to quit due to adverse effect of smoking on their health (Lundqvist et al., 2007). Cumulative quitting among the older adults over time will result in a lower prevalence of smoking and a higher prevalence of cessation.

The main strength of our study is the use of a large sample size what makes the results more representative. It is a population-based study with appropriate sampling and good interview process with supervision. The limitations of this study are the fact that the sample did not include young people. Also this study did not cover rural area.

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References

Al Turki KA, Al Baghli NA, Al Ghamdi AJ, et al (2010). Prevalence of current smoking in eastern province, Saudi Arabia. *East Mediterr Health J*, **16**, 671-6.

Al Riyami AA, Afifi M (2004). Smoking in Oman: prevalence and characteristics of smokers. *East Mediterr Hlth J*, **10**, 600-9.

Berry JD, Dyer A, Cai X, et al. (2012). Lifetime risks of cardiovascular disease. *N Engl J Med*, **366**, 321-9.

Center for Disease Control. Non-Communicable Disease Risk Factor InfoBase. Iran Ministry of Health and Medical Education. Available at: http://www.ncdinfobase.ir/english/. Accessed 15 January 2012.

De Vogli R, Santinello, M (2005). Unemployment and smoking: does psychosocial stress matter? *Tob Control*, **14**, 389-95.

Eriksen M, Mackay J, Ross H (2012). The Tobacco Atlas. 4th Ed. American Cancer Society. Brighton, UK.

Ezzati M, Henley SJ, Lopez AD, Thun MJ (2005). Role of smoking in global and regional cancer epidemiology: current patterns and data needs. *Int J Cancer*, **116**, 963-71.

Finch K, Novotny TE, Ma S, et al (2010). Smoking knowledge, attitudes, and behaviors among rural-to-urban migrant women in Beijing, China. *Asia Pac J Public Hlth*, **22**, 342-53.

Fotouhi A, Khabazkhoob M, Hashemi H, Mohammad K (2009). The prevalence of cigarette smoking in residents of Tehran. *Arch Iran Med*, **12**, 358-64.

Fotouhi A, Hashemi H, Shariati M, et al (2013). Cohort Profile: shahroud eye cohort study. *Int J Epidemiol*, [Epub ahead of print].

Gilbert AR, Pinget C, Bovet P, et al (2004). The cost effectiveness of pharmacological smoking cessation therapies in developing countries: a case study in the Seychelles. *Tob Control*, **13**, 190-5.

Hosseinpoor AR, Parker LA, Tursan d'Espaignet E, Chatterji S (2011). Social determinants of smoking in low- and middle-income countries: results from the World Health Survey. *PloS one*, **6**, 20331.

Jarvis M, Wardle J (2005). Social patterning of individual health behaviours: the case of cigarette smoking. In 'Social

Determinants of Health', eds, Marmot M, Wilkinson R. Oxford University Press, 2nd ed. London, UK, 240-55.
Khattab A, Javaid A, Iraqi G, et al (2012). Smoking habits in the Middle East and North Africa: results of the BREATHE study. *Respir Med*, **106**, 16-24.
Lundqvist G, Weinehall L, Öhman A (2007). Attitudes and barriers towards smoking cessation among middle aged and elderly women: a qualitative study in family practice. *Internet J Hlth*, **5**, 1-10.
Meysamie A, Ghaletaki R, Haghazali M, et al (2010). Pattern of tobacco use among the Iranian adult population: results of the national Survey of Risk Factors of Non-Communicable Diseases (SuRFNCD-2007). *Tob Control*, **19**, 125-8.
Mohammad K, Noorbala A, Majdzadeh SR, Karimloo M (2001). Trend of smoking prevalence in Iran from 1991 through 1999 based on two national health surveys. *Hakim Medical J*, **3**, 290-4.
Nasir K, Rehan N (2001). Epidemiology of cigarette smoking in Pakistan. *Addiction*, **96**, 1847-54.
Norum KR (2005). World Health Organization's Global Strategy on diet, physical activity and health: the process behind the scenes. *Scandinavian J Nutrition*, **49**, 83-8.
Rani M, Bonu S, Jha P, Nguyen SN, Jamjoum L (2003). Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross sectional household survey. *Tob Control*, **12**, 4.
Sarraf-Zadegan N, Boshtam M, Shahrokhi S, et al (2004). Tobacco use among Iranian men, women and adolescents. *Eur J Public Hlth*, **14**, 76-8.
Thun MJ, Carter BD, Feskanich D, et al (2013). 50-year trends in smoking-related mortality in the United States. *N Engl J Med*, **368**, 351-64.
World Health Organization (2012). WHO NCD Surveillance strategy. WHO. Geneva. Available at: http://www.who.int/ncd_surveillance/strategy/en/index.html. Accessed 15 January 2012.
World Health Organization (2011). Global status report on noncommunicable diseases 2010. WHO. Geneva.
World Health Organization (2011b). Tobacco Free Initiative (TFI), Tobacco control country profiles. WHO. Available at: http://www.who.int/tobacco/surveillance/policy/country_profile/en/index.html. Accessed 15 January 2012.
Youssef RM, Abou-Khatwa SA, Fouad HM (2002). Prevalence of smoking and age of initiation in Alexandria, Egypt. *East Mediterr Health J*, **8**, 626-37.