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Original Article

Prevalence and Other Correlates of Ever Smoking in Saudi Arabia: Results of a National Survey

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Abstract

Background: Updated information on prevalence of ever smoking and its related factors is necessary for planning smoking control programs.
Objective(s): The current study aimed at assessing the prevalence and identifying the associated factors and predictors of ever cigarette smoking among the Saudi adult population.
Methods: The current study was a secondary analysis of the cross-sectional community-based survey conducted by the WHO in collaboration with the Saudi Ministry of Health in 2005 using WHO STEP wise approach. A multistage, stratified, cluster random sampling was applied to select a total sample of 5000 Saudi adults aged 15 to 64 years. The interview questionnaire included socio-demographic characteristics, status of smoking, and physical activity pattern. Blood pressure, weight and height were measured. Blood samples were drawn for assessment of fasting blood sugar, total and HDL cholesterol.
Results: The prevalence of ever smoking was 21.6%. Just over half of the subjects were females, about 23% less than 25 years, while about 11% more than 55 years of age. Ever smoking was significantly associated with male gender, younger age, and lower education and income levels. Of all study subjects 12.5% were categorized as ever smokers and practicing low level of physical activity. Additionally, 15.2% were categorized as ever smokers and non-obese. Ever smoking was significantly associated with low physical activity and non-obesity. No significant association between ever smoking and hypertension, diabetes mellitus or cholesterol level was found. The significant predictors of ever smoking were male gender and lower educational level.
Conclusion: Ever smoking was prevalent among Saudi adult population indicating a need to develop community-based and effective tobacco control programs to reduce this risk.

Keywords: Ever smoking, prevalence, socio-demographic characteristics, adults, Saudi Arabia

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INTRODUCTION

Tobacco smoking is a major public health problem causing several morbidities and even mortality. WHO has reported that tobacco use (smoking and smokeless) is right now responsible for death of around six million individuals over the world every year with many of these deaths happening prematurely. This number includes about 600,000 persons who are estimated to die from the effects of second-hand smoke [(1)].

In 2012, 21% of the worldwide population aged 15 and above smoked tobacco. The rate at which males smoked was five times higher than that of females; the average rates were 36% and 7% respectively. Smoking among men was the highest in the WHO Western Pacific Region, with 48% of men smoking some form of tobacco. Smoking among women was most elevated in the WHO European Region at 19 % [(2)]. In 2014, about 17 of every 100 U.S. adults aged 18 years or more (16.8%) smoked cigarettes. This implies an estimated 40 million adults in the United States smoke cigarettes [(3)]. Cigarette smoking is the leading cause of preventable disease and death in the United States, speaking to more than 480,000 deaths each year, or 1 of every 5 deaths [(4)]. More than 16 million Americans live with smoking-related illnesses. Current smoking has declined from almost 21 of every 100 adults (20.9%) in 2005 to about 17 of every 100 adults (16.8%) in 2014 [(3)].

In the Middle East and North Africa (MENA) region, the purpose of a descriptive study was to assess smoking patterns in a general population sample of 62,086 individuals aged ≥ 40 years in ten nations in the region (Algeria, Egypt, Jordan, Lebanon, Morocco, Saudi Arabia, Syria, Tunisia, Turkey and United Arab Emirates), together with Pakistan, utilizing a standardized methodology. The age- and gender-adjusted proportion of respondents showed current or past smoking of cigarettes or water pipes was 31.2% [5].

According to the Center of Disease Control (CDC), ever smokers were characterized as the individuals who reported having smoked ≥100 cigarettes during their lifetime [3]. It is essential to survey the prevalence of ever smoking and its related factors as necessary elements for planning smoking control programs. Therefore, the present study aims to assess the prevalence and identify the associated factors and predictors of ever cigarette smoking among the Saudi adult population.

METHODS

The current study was done as a secondary analysis of the cross-sectional community-based survey covering the entire population of Saudi Arabia in 2005. The WHO STEP wise approach to surveillance (STEPS) of non-communicable diseases (NCD) risk factors was the basis for conducting the survey and collecting the data [6]. Ever smokers included in this study are the current and former smokers combined.

Study population: Saudi population aged 15 to 64 years from all the 20 health regions of Saudi Arabia

Sample size and Sampling method: A multistage stratified cluster random sampling technique was used to select the study participants. Stratification was based on age (Five, 10 year- interval, age groups), gender (2 groups) and health regions of the country. Based on proposed methodology of STEP wise approach a sample size of 196 was calculated for each of these ten strata (precision 7%, confidence level 95% and expected prevalence 50% to assure highest level of sample for given precision for a multiple risk factors study). To adjust for regional variation in each age/gender stratum sample size was doubled to ensure minimum precision of 7% throughout the whole country, and then round of to 500 for each age-gender stratum, giving a final sample size of 5000. Each region was assigned a sample proportionate to its population size. A list of all primary health care centers (PHCCs) in every region was arranged and 10% of these PHCC were randomly chosen, and allocated regional sample to them proportionate to the size of their catchment population in sampled PHCCs. To recognize the households a map of the health center coverage area was utilized to select the houses. Every house was assigned a number and a simple random draw was done.

Data collection tools: Data had been collected using the WHO STEP wise approach which included an Arabic interview questionnaire about socio-demographic characteristics, status of smoking, and physical activity pattern. Blood pressure, weight and height were measured. Blood samples were drawn from all the participants and were sent to regional labs for assessment of fasting blood sugar, total and HDL cholesterol

Data management and statistical analysis: Questionnaires collected from the field were reviewed before submitting for data entry. Double entry of the questionnaires was performed using EPI-INFO and EpiData programming. After data entry, data cleaning was conducted. Descriptive statistics, univariate, and multivariate analysis were used as appropriate. Logistic regression model was done to show the significant predictors of ever smoking habit. The level of significance was set to <0.05 all through the study. Data were processed in SPSS (Version 17) software .

Ethical consideration

A permission to conduct this secondary analysis study was obtained from authorized representatives in the department of Non-communicable diseases, Saudi Ministry of Health and the WHO. The proposal and the instruments of the surveillance were accepted by the Ministry of Health, Center of Biomedical Ethics and the concerned authorities in Saudi Arabia. Informed consents from the participants were obtained. Confidentiality of data was assured and the resulting data will be utilized just for the stated purpose of the survey.

RESULTS

Out of a total 5000 subjects originally included in the selected sample 4751 have complete data giving a response rate of over 95%. As shown in table (1), the prevalence of ever smoking habit is 21.6%. Just over half of the subjects were females, about 23 % less than 25 years while about 11% more than 55 years age, majority of employed are government employees, and about one third with a monthly income of less than 3000 Saudi Riyals (1 US $ = 3.75 SR). Ever smoking habit was significantly associated with male gender, younger age, and lower education and income levels.

Table (2) shows the distribution of ever smoking habit according to physical activity and obesity. Two thirds of the total subjects were practicing low physical activity and more than one third were obese. Of all study subjects 12.5% were categorized as ever smokers and practicing low level of physical activity. Additionally, 15.2% were categorized as ever smokers and non-obese. Ever smoking habit was significantly associated with low physical activity and non-obese subjects. From table (3) it is noticed that there is no significant association between ever smoking and hypertension, diabetes mellitus or cholesterol level. Table (4) shows logistic regression analysis for

significant predictors of ever smoking habit. All variables in the univariate analysis were entered in the logistic model. The significant predictors are male gender and lower educational level.

Table (1): Prevalence of ever smoking according to subjects' socio-demographic characteristics

Characteristics	Total Sample N	(%)	Ever smokers Number	% of Total	P-value
Gender:					
Male	2335	(49.1)	976	20.5	0.001
Female	2416	(50.9)	49	1.0	
Total	4751	(100)	1025	21.6	
Age (Years):					
15 -24	1074	(22.6)	183	3.9	0.001
25 -34	1128	(23.7)	249	5.2	
35-44	1165	(24.5)	266	5.6	
45-54	841	(17.7)	193	4.1	
55+	543	(11.4)	134	2.8	
Total	4751	(100)	1025	21.6	
Education:					
Illiterate	1255	(26.5)	146	3.1	0.001
Primary	1220	(27.5)	335	7.1	
Intermediate & Secondary	1540	(32.5)	387	8.2	
University	607	(12.8)	122	2.6	
Vocational	120	(2.5)	35	0.7	
Total	4742	(100)	1025	21.6	
Occupation:					
Government employee	1368	(28.8)	498	10.5	0.001
Non-government employee	454	(9.6)	198	4.2	
Student	647	(13.6)	89	1.9	
Unemployed	2276	(48)	238	5.0	
Total	4745	(100)	1023	21.5	
Income(Saudi Riyals):					
<3000	1492	(33.1)	302	6.7	0.009
3000 – 6999	1011	(22.4)	220	4.9	
7000- 9999	1329	(29.5)	332	7.4	
10000 +	672	(14.9)	131	2.9	
Total	4504	(100)	985	21.9	

Table (2): Distribution of ever smoking habit according to life style characteristics

Characteristics	Total Sample N	(%)	Ever smokers Number	%	P-Value
Physical Activity:					
High	764	(16.6)	196	19.9	0.001
Medium	771	(16.8)	213	21.7	
Low	3064	(66.6)	574	58.4	
Total	4599	(100)	983	100	
Obesity					
Obese	1656	(36.1)	277	28.4	0.001
Not Obese	2927	(63.9)	698	71.6	
Total	4583	(100)	975	100	

Table (3): Distribution of ever smoking habit according to morbidities

Morbidity	Total Sample N (%)	Ever smokers Number	Ever smokers %	P-Value
Hypertension				
Hypertensive	976 (21.5)	212	22	0.346
Normotensive	3548 (78.5)	750	78	
Total	4524 (100)	962	100	
Diabetes Mellitus				
Diabetics	1035 (23.8)	235	25.2	0.133
Not Diabetics	3321 (76.2)	698	74.8	
Total	4356 (100)	933	100	
Cholesterol level				
Elevated	866 (19.3)	193	20.3	0.207
Not elevated	3622 (80.7)	759	79.7	
Total	4488 (100)	952	100	

Table (4): Logistic Regression Analysis for predictors of Ever Smoking

Predictor	Beta	S.E.	Sig.	Odds Ratio	95% C.I. for OR	
Gender	3.538	0.168	0.000	34.386	24.727	47.819
Age	-0.004	0.004	0.257	0.996	0.988	1.003
Physical Activity	0.053	0.058	0.357	1.055	0.942	1.182
Obesity	0.002	0.083	0.985	1.002	0.852	1.178
Education	0.100	0.041	0.016	1.105	1.019	1.198
Occupation	0.044	0.030	0.144	1.045	0.985	1.108
Income	0.027	0.046	0.557	1.027	0.939	1.123
Constant	3.658	0.587	0.000	0.026		

DISCUSSION

The prevalence of ever smoking in the current study is 20.5% among males and only 1% among females. This rate is below the worldwide prevalence of current smoking among persons aged 15 years and over reported by the WHO global report. The worldwide point estimate was 25.9% for men and 2.8% for women in 2010. Moreover, this figure is expected to change in 2020 where the point estimates will be increased among men (32.2%) and will be declined very little among women (2.7%). By 2025, if tobacco control programs proceed at the same intensity, WHO projects the rates to be about 36% for men and 3% for women [(1)]. In Saudi Arabia, the prevalence of smoking any tobacco product among persons aged 15 years or above in 2015 was 27.9% in males and 2.9% in females. In 2025, this prevalence is expected to increase to 35.5% among males. Obviously, the rate of ever smoking among the Saudi adult population is increasing [(7)] which might show insufficient and/or ineffective tobacco control programs. Meanwhile this increasing rate alerts the community to exert more efforts in order to cut the rate of this fatal behavioral risk factor. The present study revealed that the prevalence of ever smoking is higher among males than females and this result is in consistence with many other national studies [(7-11)]. Generally, smoking among women is socially unaccepted in most of the Arab communities including Saudi Arabia and some women will cover up their smoking status, for this reason the true prevalence of female tobacco smoking could be underestimated. The highest rate of ever smoking (10.8%) was reported among age group 25–44 years. These findings are also consistent with the results reported by a community-based cross- sectional study conducted in Jazan area in southwest Saudi Arabia and aimed to identify the prevalence and associated socio-demographic factors of cigarette smoking. Authors reported that the pattern of ever-smoking differed significantly among the categories of every independent variable, including gender and working status as well as region, marital status, level of education, and age [(8)].

Looking at educational level, income, and occupational status it is noticed that low educational level, low- income, and working at the governmental sectors are strictly linked to ever smoking habit. Socioeconomic status (SES) has a focal part among the determinants of smoking. Persons of lower SES will probably be smokers than are those of higher SES [(12, 13)]. Among many measures of SES, education is

associated reliably and strongly with smoking [14-16]. Psychosocial variables like depressive symptoms, anxiety, and lower coping potentials might be mediating factors between smoking and education [17]. A study conducted by Kaplan et al., found that the prevalence and incidence of depressive symptoms are higher among individuals with less education [18]. Additionally, lower education is associated with higher risk for anxiety disorders [19].

Results of the present study showed that ever smoking habit is significantly associated with non-obesity. This finding is consistent with different studies which found that smokers have lower body weight and BMI than non-smokers [20, 21]. On the contrary, results of a cross-sectional study in a sample of healthy Austrian adults demonstrated that the number of cigarettes smoked per day was significantly associated with higher body weight and BMI [22]. In another study conducted in South Korea to assess the association between cigarette smoking and diverse types of obesity, the authors concluded that although smokers did not show significant difference in mean body mass index than those who never smoked, they demonstrated more metabolically adverse fat distributions with increasing smoking amounts [23].

With respect to the relation between hypertension and ever smoking, our findings showed that there was a statistically insignificant difference between ever smoking group and the total sample regarding the blood pressure levels. Many researches had been conducted to study the relation between smoking and blood pressure and came into questionable results. Some studies showed that there is no association between smoking and blood pressure level [24]. Others reported that blood pressure of smokers was lower than that of non-smokers [25, 26]. And some documented that smoking would increase the blood pressure level [27, 28]

Smoking releases the sympathetic neurotransmitters norepinephrine and epinephrine which causes hemodynamic and metabolic changes through adrenergic mechanisms [29]. The as-sociation of chronic smoking with decreased blood pressure suggests the existence of substances other than nicotine in tobacco smoke which would have an opposite, hypotensive action [24]. One possible explanation for the discrepancy in the reported findings of different studies is basically due presence of several confounding variables which impact the blood pressure and couldn't be totally controlled during conduction of these studies.

Our results demonstrated that there is no significant association between ever smoking habit and diabetes mellitus. These findings are in concurrence with the outcomes reported by Lizia et al. as the researchers observed that there were no differences between smokers, non-smokers and former smokers regarding the fasting glucose (FG) levels. However, heavy smokers (>20 cigarettes per day) demonstrated significantly higher levels of FG in comparison with light and moderate smokers. The significance persisted after controlling for age, physical activity and energy intake [22].

In general, neither smoking status nor smoking intensity was positively associated with the levels of total cholesterol or low density lipoprotein. These serum lipid parameters seem to be little affected by smoking [30]. However, other investigators reported an association of cigarette smoking with low levels of total cholesterol or low density lipoprotein-cholesterol [31]. In the present study, non-elevated cholesterol levels are insignificantly associated with ever smoking status.

CONCLUSION

Ever smoking is prevalent among Saudi adult population. This habit is significantly associated with male gender and lower education levels. The association between ever smoking and low physical activity level constitute a double behavioral risk for major morbidity especially cardiovascular diseases. Community-based and effective tobacco control programs are needed to reduce this risk.

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