

Epidemiology, attitudes and perceptions toward cigarettes and hookah smoking amongst adults in Jordan

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Abstract

Objectives The aims of this study are to assess cigarette and hookah smoking rates amongst adult population in Jordan and to determine predictors of smoking status. Selected beliefs, perceptions and attitudes toward cigarettes and hookah smoking were also assessed.

Methods This cross-sectional study was conducted in five regional governorates of Jordan through face-to-face interviews on a random sample of adult population aged 18–79 years. Data was collected using a piloted questionnaire based on the Global Adult Tobacco Questionnaire.

Results The overall prevalence of cigarette smoking in our sample (869) was 59.1 % amongst males and 23.3 % amongst females, while the overall prevalence of hookah smoking was 18.9 % amongst males and 23.1 % amongst females. Leisure and imitation were the most commonly reported reasons for smoking. Regardless of smoking status, people were aware of health risks associated smoking and also had negative perceptions toward smoking.

Conclusions Smoking rates for both genders have reached alarmingly high rates in Jordan. There is an urgent need for a comprehensive national programme to target the country's growing burden of smoking. Suggestions on leisure time activities should be included in such programmes.

Keywords Smoking · Cigarettes · Hookah · Adult · Jordan

Introduction

Tobacco smoking has reached epidemic proportions in many countries around the world. According to the World Health Organization (WHO) this epidemic has become one of the biggest public health threats that the world has ever faced. The WHO estimates there are more than 5 million deaths from direct tobacco use and 600,000 deaths from second-hand smoking annually; low- and middle-income countries are worst affected by tobacco in terms of morbidity and mortality [25].

Results from recent systematic review on global tobacco use showed that there are wide variations in smoking rates between countries for both genders. The estimated prevalence of daily smoking in men ranged from more than 50 % in countries such as Armenia, Indonesia, and Russia, to less than 10 % in countries such as Ethiopia, Nigeria, Sao Tome and Sudan [16].

Data from the Middle East indicates that smoking is highly prevalent amongst males but not amongst females. For example, a national survey from Kuwait revealed that the prevalence of smoking was 34.4 % (95 % confidence interval (CI) 32.2–36.6) among men and 1.9 % (95 % CI 1.3–2.5) among women. These figures are similar to those

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from Morocco where the overall prevalence of ‘current smokers’ was 31.5 % for males and 3.1 % for females [14].

Assessment of the global burden of tobacco indicates that prevalence of cigarette smoking is declining [18], while the prevalence of hookah smoking (also known as shisha, water pipe, narghile) is increasing dramatically, particularly among young age groups [16]. A recent systematic review concluded that hookah(tobacco) smoking is a significant risk factor for lung cancer, respiratory illnesses, low birth weight and periodontal disease [2]. Recent systematic review on hookah smoking concluded that while very few national surveys have been conducted, the prevalence of hookah smoking is reaching high levels among high school students and university students in Middle Eastern countries as well as amongst groups of people of Middle Eastern descent living in Western countries [1]. The prevalence of current hookah smoking among university students was similar in the Arabian Gulf (6 %), the United Kingdom (8 %) and the United States (10 %), but considerably higher in Syria (15 %), Lebanon (28 %) and Pakistan (33 %) [2]. Attitudes and beliefs about hookah smoking held by community members in the above countries are important determinants of community-wide changes in hookah smoking behaviour [22]. A study on young adults from California showed that 57 % of the participants believed that hookah was not harmful to their health, and 60 % reported socialization as the main reason why they smoked hookah [19].

Data from Jordan National Behavioral survey, conducted in 2004 and published in 2008, showed that nearly 40 % of all adults aged 25 years or older reported having smoked at least 100 cigarettes during their lifetime [5]. The age standardized prevalence of current smoking was 28 %, with nearly half of men (48.2 %) reporting current smoking behaviour compared to only 5.1 % of women. This study, however, did not assess hookah smoking and did not differentiate between regular and irregular cigarette smokers.

A recently published study (September 2014) presents a population-based study, in which data collected between January and March 2011 and included 3,196 adults aged 18 or older. This study showed that some one-third of participants are smokers with an overall prevalence of 32.3 % (54.9 % of males and 8.3 % of females). The proportion of ex-smokers was 2.9 %. The most common form of smoking among current smokers was cigarette smoking (93.0 %) followed by hookah (8.6 %). This study, however, did not differentiate between regular (daily) and irregular smokers or between light and heavy hookah smokers [11].

Studies on tobacco smoking among university students in Jordan showed that hookah smoking has become a major public health problem in Jordan, similar to the regional

trend. These studies also indicate that cigarettes and hookah smoking rates are growing in Jordan [4, 8].

The WHO has recommended that good surveillance of the tobacco epidemic is one of the keys to success in tobacco control programmes. The growing number of hookah cafes in Jordan and the lowering of tobacco prices in the last 3 years, might lead to an increase in smoking in Jordan [17, 21, 24, 25]. Also, there has been no published study from Jordan on attitudes and perceptions towards hookah and cigarettes smoking in Jordan. Previous studies did not provide separate data for regular and irregular cigarette smoking or for light and heavy hookah usage. We, therefore, conducted this national survey using the Global Adult Tobacco Questionnaire (GAT) [26] to assess cigarettes and hookah smoking rates amongst the adult population in Jordan and to determine predictors of smoking status. We also assessed selected beliefs, perceptions and attitudes toward cigarettes and hookah smoking. Finally, we also evaluated support available to smokers and adherence to tobacco laws; this will be published separately.

Materials and methods

This cross-sectional study was conducted in five governorates in Jordan: Irbid and Jerash governorates in the north of Jordan; Amman and Zarqa governorates in the middle of the country; and Karak governorate in the south of Jordan. This survey was conducted as face-to-face interviews on a random sample of the adult population aged 18–79 years of age.

Multistage sampling technique was used in this study. Jordan was divided into three regions: Southern, Middle and Northern. Cluster sample for governorates was obtained from each region. The main city in each governorate was stratified by socioeconomic status into low, middle and high ranges. Two villages and two towns were selected randomly from each Governorate. A random sample was selected from each area.

Eligibility criteria

Inclusion criteria adults aged 18 to 79 years; speaks Arabic fluently and permanently lives in Jordan. *Exclusion criteria* not living permanently in Jordan or has lived in Jordan for less than one year; patients with psychiatric conditions; and those having difficulty in communication or any other medical conditions limiting their ability to complete the survey.

Study questionnaire The global adult tobacco questionnaire (GAT) was developed as a standard approach to monitor adult smoking worldwide [26]. The validated Arabic version was obtained with permission for use in this study from the Office of Smoking and Health, National

Center for Chronic Disease Prevention and Health Promotion, Centers for Diseases Control and Prevention, USA. We added some questions to the baseline characteristics to cover items such as income, region in Jordan, nationality and medical history. We piloted the questionnaire in study regions on 30 subjects in each region. The questionnaires distributed in the pilot phase were not used in the final analysis.

The questionnaire was divided into six sections. The first section contained baseline information covering demography, educational status, employment, family monthly income, religion and history of chronic illnesses.

The second section covered cigarette smoking habits. It included items on number of daily cigarettes, age of initiation of daily smoking, reason(s) for smoking, time of first cigarettes, previous trial of quitting, reasons for not quitting if they tried unsuccessfully to quit previously, reason for returning to smoking if they had successfully quit previously; other questions addressed health advice received, awareness of smoking cessation helpline and awareness of smoking cessation pharmaceutical interventions. Finally, there was a question for women on smoking status during previous pregnancies.

Regular smoking was defined as smoking on a daily basis, while irregular smoking was defined as not on a daily basis [6]. ‘Heavy hookah smoking’ was defined as smoking hookah three or more times weekly [19], while ‘light hookah smoking’ was described hookah smokers who smoked hookah less than three times weekly but more than once monthly [10]. ‘Regular ex-smokers’ referred to participants who smoked previously on a daily basis, while ‘irregular ex-smokers’ described participants who smoked previously but not on a daily basis [26].

The third section of the questionnaire was on hookah smoking. It covered the same questions included in the second section concerning smoking habits.

The fourth section targeted ex-smokers. It included questions on duration of smoking and reasons for quitting.

The fifth section was for all participants and included questions on knowledge, attitudes and perceptions towards smoking. It assessed other family members’ perceptions towards smoking. There were also three questions for health care professionals related to smoking status and the influence of their profession on their behaviour.

The sixth section, and last part of this survey, dealt with passive smoking including at home, work and public places. It also contained questions on smoking and anti-smoking advertisements.

Ethical approval for conducting this study was obtained from the Central Ethics Committee at the Faculty of Medicine in Mutah University. Regarding confidentiality of the data collected, no personal data such as participants’ name, address or telephone number was reported.

The questionnaire was administered through face-to-face interviews with participants meeting the inclusion criteria and agreement to participate in the study. Interviews were conducted by medical students from the fourth to sixth year of their academic study at Mutah University. These research assistants received two lectures on the topic and four training sessions on completing the study questionnaire; the principal investigator conducted all training.

Eligible participants were interviewed alone unless they preferred to be accompanied by a friend or family member. Participants were free to not answer any question or to withdraw from the interview without being questioned. The research assistants were instructed to thank them for their time and taking part in the survey.

Sample size calculations

Data from Jordan National Behavioral survey, conducted in 2004 and published in 2008, shows that nearly 40 % of all adults aged 25 years or older reported having smoked at least 100 cigarettes during their lifetime [5]. Age standardized prevalence of current smoking was 28 % with nearly half of men reporting current smoking behavior compared to 5 % of women.

Past 30-day hookah tobacco smoking rates were 59 % for males and 13 % for females [13]. Therefore, a sample of size 385 males and 196 females at 95 % significance level and 5 % error margin, would be sufficient. Being conservative, the authors have agreed on sampling 530 males and 350 females. This would allow for subgroup analysis.

Statistical analysis plan

Data analysis was carried out using R statistical analysis software version 3.1.2 (R Foundation for Statistical Computing; Vienna, Austria, 2014). Summary statistics including smoking prevalence were obtained and reported as necessary. For all performed statistical analyses, a significance level of 0.05 was assumed. The Chi squared testing procedure was used to test for association between the study factors and smoking status for both cigarette and hookah smokers. Multinomial logistic regression models were built to identify significant predictors of smoking status. The Akaike Information Criterion (AIC) was used for regression model selection.

Results

A total of 874 participants with mean age of 33.9 ± 13.3 years were interviewed between July 2014 and December 2014. Males comprised 60.5 % of study participants. Most of the sample (93.8 %) were Jordanian

nationals. Married participants represented 53.1 % of the study, singles represented 44.9 % and widowed or divorced comprising a little over 1 % each. Most participants (97.8 %) were literate with nearly half of them having completed either university education (41.6 %) or post-graduate education (10.2 %).

Regarding reported medical history of study participants, 3.0 % had history of ischemic heart disease, 10.5 % had history of hypertension, 8.4 % had history of bronchial asthma and 4.1 % had history of chronic obstructive airways disease.

Smoking status of study participants

The prevalence of regular cigarette smoking was 51.9 % amongst males and 14.1 % amongst females, while the prevalence of irregular cigarette smoking was 7.2 % amongst males and 9.2 % amongst females. The prevalence of heavy hookah smoking was 6.8 % for males and 6.7 % for females. The prevalence of regular cigarette smoking combined with heavy hookah smoking was 3.8 % for males and 1.1 % for females, while the prevalence of regular cigarette smoking combined with light hookah smoking was 11.4 % for males and 1.1 % for females. Regarding ex-smokers, the total number was 38.49 %: i.e. 33.49 % amongst males and 5 % amongst females (Table S1).

Figure 1a–c show smoking status for cigarettes and hookah by gender and age group. The age group with the highest prevalence of regular cigarette smoking was 35–44 for males and 45–54 for females; the lowest prevalence was reported for males aged 65 or older and females within the age group of 18–24 (Fig. 1a). For hookah smoking, females within the 25–34 years age group had the highest prevalence of light or heavy hookah smoking; amongst males, the same age group had the highest prevalence for heavy hookah smoking (Fig. 1b). Moreover, both males and females from the 25–34 years age group also had the highest prevalence of regular smoking combined with hookah smoking regardless whether light or heavy usage (Fig. 1c).

Smoking status by selected socioeconomic indicators and medical history shows that divorced participants were most likely to be regular smokers (50.0 %) or heavy hookah smokers (12.5 %) when compared with single married or widowed participants. The regular smoking rates and heavy hookah smoking rates for singles were 32.9 and 6.7 %, respectively, while the rates for married participants were 39.9 and 6.9 %, respectively. Living alone was also associated with higher rates of regular smoking (39.1 %), heavy hookah smoking (20.0 %), and regular smoking with heavy hookah smoking (12.5 %) when compared with the remaining participants (Table S1).

Female smokers were asked about changes in their habit during pregnancy. For cigarette smokers, 44.4 % of them

reported they gave up smoking during pregnancy. The remaining participants either reported they did not change their habit (11.1 %) or continued smoking but with smaller quantities (26.7 %) or less time (17.8 %). For hookah smoking, 71.4 % reported stopping during pregnancy, while 2.86 % continued smoking at the same rates during their pregnancies, 20 % reduced their frequency and 5.71 % reduced the duration of hookah sessions.

The mean age initiation to cigarette smoking was 20.0 ± 7.1 , while the mean age of hookah smoking initiation was 21.9 ± 8 . The most commonly reported reason for cigarette smoking was leisure (55.1 %), followed by imitation (33.0 %). In contrast, the most commonly reported reason for hookah smoking was imitation (77.6 %) followed by leisure (8.6 %). Interestingly the mean number of daily cigarettes was 24 ± 6.7 with 28.2 % of smokers reported starting smoking within the first five minutes after wake-up. Finally the mean number of hookah sessions per month was 8.3 ± 7.9 (Table 1).

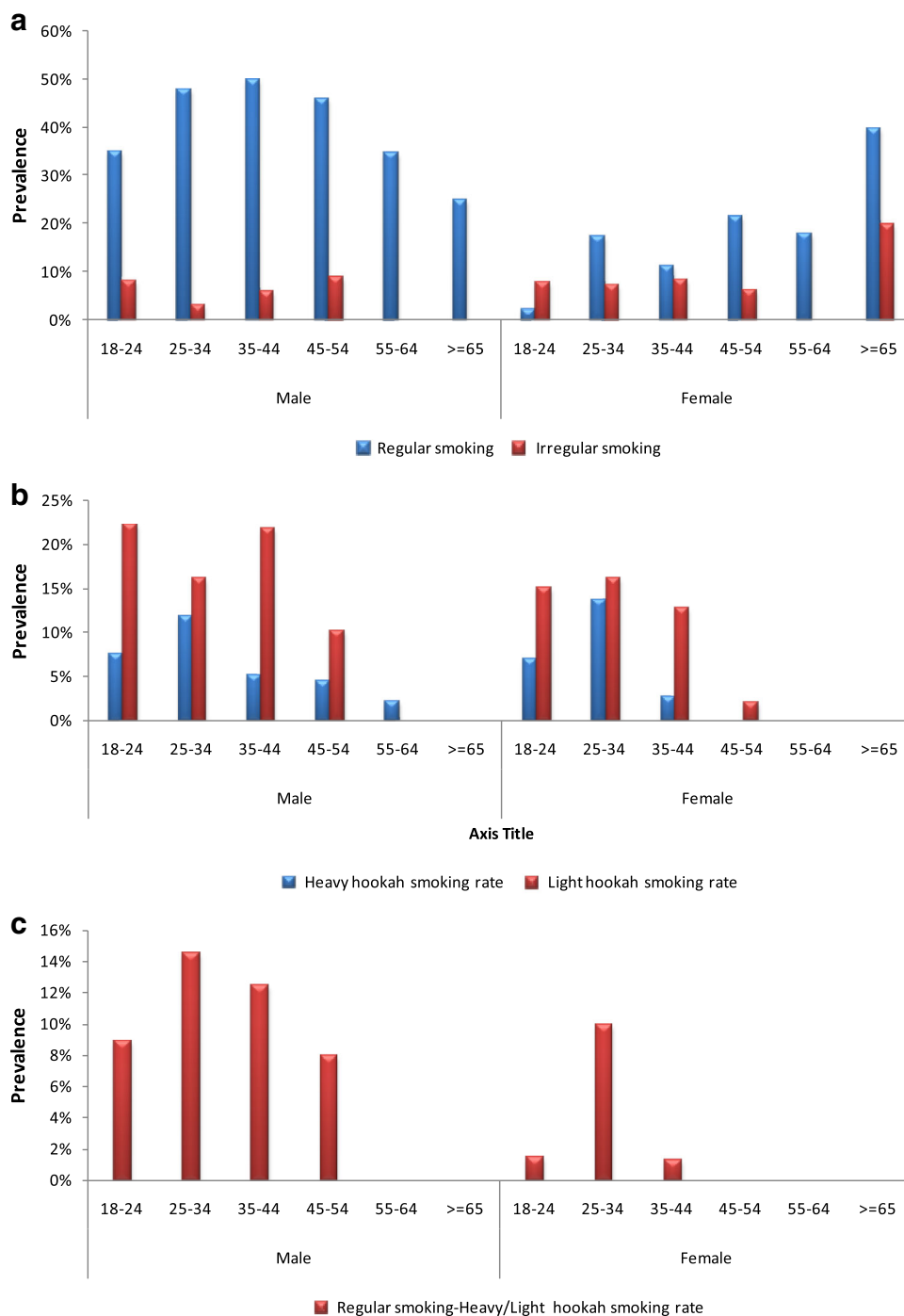
Reasons for ex-smokers quitting

The most commonly reported reason for quitting by regular ex-smokers was health (40.5 %) followed by awareness of smoking risks (33.3 %). Around one-third of the ex-smokers (31.5 %) strongly agreed/agreed that their family history of ischemic heart disease affected their decision to quit and 23.0 % strongly agreed/agreed that their family history of cancer affected their decision (Table 2).

Perceptions and beliefs related to cigarettes and hookah smoking by smoking status

Perceptions and beliefs related to cigarette and hookah smoking by smoking status showed, unsurprisingly, 85.1 % of ‘never smokers’ strongly agreed/agreed with the statement “smoking causes early death” compared to lower proportions of cigarette or hookah smokers. An alarming result was that around three-quarters of regular cigarette smokers or heavy hookah smokers strongly agreed/agreed with the statement “smoking lowers tension or anger” compared to 23.6 % of ‘never smokers’. Most study participants strongly agreed/agreed with the statement “smoking hookah is more socially acceptable than cigarettes”. Interestingly, 73.4 % of all participants and 61.8 % of heavy hookah smokers strongly disagreed/disagreed with the statement that “hookah smoking does not harm”. The same trend was also observed for the statement “cigarette smoking harms health” where 88.8 % of our sample and 88.9 % of regular smokers strongly agreed/agreed with this statement (Table 3).

Fig. 1 Cigarettes and Hookah smoking rates by gender and age group. **a** Regular and irregular cigarettes smoking rate by gender and age group, **b** heavy and light hookah smoking rate by gender and age group, and **c** regular cigarettes smoking and heavy/light hookah smoking rate by gender and age group



We also assessed the attitudes and perceptions of smokers within the health care profession. All heavy hookah smokers and 73.8 % of regular smokers strongly agreed/agreed with the statement “as a health care professional, I must give up smoking.” However, only 50.0 % of regular smokers and 61.5 % of heavy hookah smokers strongly agreed/agreed with the statement “my profession has helped me in reducing frequency of cigarettes or hookah smoking and have made me think of quitting.”

Attitudes of the family toward their members smoking

Regardless of the high smoking rates detected in our study, 61.7 % of our sample disagreed/strongly disagreed with the statement “I accept my family members smoking hookah” with no difference by heavy hookah smoking status (59.6 %). The same trend was seen for accepting other family members smoking cigarettes: 64.2 % of total

Table 1 Frequency and reasons for smoking cigarettes or waterpipe

Question	Category	Cigarette smokers				Waterpipe smokers			
		Daily	Percent	Irregular	Percent	Heavy	Percent	Light	Percent
Mean duration of smoking	Mean	15.59		7.85		8.10		6.00	
	SD	10.95		8.38		7.80		7.27	
Mean age at smoking initiation	Mean	19.78		22.44		20.71		22.71	
	SD	6.76		10.16		8.32		7.94	
Average number of cigarettes per month	Mean	24.00		6.74		32.73		4.28	
	SD	14.27		7.72		18.39		2.79	
Mean cost of smoking per month	Mean	66.78		19.18		32.48		16.70	
	SD	48.08		21.84		26.81		19.67	
Reason for smoking	Expression of masculinity and femininity	6	2.6 %	0	0.0 %	1	1.7 %	1	0.8 %
	Imitation	75	33.0 %	10	30.3 %	45	77.6 %	102	80.3 %
	Leisure	125	55.1 %	22	66.7 %	5	8.6 %	14	11.0 %
	Other	21	9.3 %	1	3.0 %	7	12.1 %	10	7.9 %
Time to start smoking after wake-up	31–60 min	54	21.8 %	1	3.3 %				
	6–30 min	69	27.8 %	3	10.0 %				
	In 5 min	70	28.2 %	2	6.7 %				
	More than 60 min	49	19.8 %	21	70.0 %				
	No answer	6	2.4 %	3	10.0 %				

Table 2 Reasons for quitting for ex-smokers

Question	Category	Cigarette smokers			
		Daily	Percent	Irregular	Percent
Mean duration of smoking	Mean	16.98		4.04	
	SD	11.38		4.11	
Mean age at smoking initiation	Mean	20.21		19.46	
	SD	7.08		3.71	
Mean age when quitting	Mean	35.18		22.92	
	SD	10.76		7.19	
Why did you quit smoking	Advice from a medical professional	2	4.8 %	1	8.3 %
	Advice from family member	4	9.5 %	1	8.3 %
	Financial reasons	0	0.0 %	1	8.3 %
	Health reasons	17	40.5 %	3	25.0 %
	Perceived risks of smoking	14	33.3 %	3	25.0 %
	Other	5	11.9 %	3	25.0 %
Relative with IHD affected your decision of quitting	Strongly agree	11	20.4 %	4	25.0 %
	Agree	6	11.1 %	2	12.5 %
	Neutral	15	27.8 %	6	37.5 %
	Disagree	11	20.4 %	3	18.8 %
	Strongly disagree	11	20.4 %	1	6.3 %
Relative with cancer affected your decision of quitting	Strongly agree	6	11.5 %	1	6.3 %
	Agree	6	11.5 %	3	18.8 %
	Neutral	16	30.8 %	7	43.8 %
	Disagree	12	23.1 %	3	18.8 %
	Strongly disagree	12	23.1 %	2	12.5 %

sample and 65.6 % for regular cigarette smokers disagreed/strongly disagreed with this statement. Attitudes of parents toward smoking by their sons and daughters were reported by parents, sons and daughters. Regardless of smoking status, more than 80 % of parents strongly disagreed/disagreed on their sons or daughter smoking cigarettes or hookah. E.g. 85.8 % and 89.0 % of regular cigarette-smoking parents strongly disagreed/disagreed with their son or daughter smoking hookah, respectively. On the other hand, 65.6 % and 71.9 % of heavy hookah-smoking parents strongly disagreed/disagreed with their son or daughter smoking hookah, respectively (Table 4).

Regression analysis

Multinomial logistic regression with AIC selection criteria was used to identify significant predictors of cigarette and hookah smoking status. Cigarette smokers were categorized, as stated before, into regular, irregular and ‘never smokers’, while hookah smokers were categorized into heavy, light and ‘never smokers’. The ‘never’ category was set as the reference category for both.

Gender, age and having a family member with cancer were the significant predictors of cigarette smoking status. Male participants had higher probability of being regular or irregular cigarette smokers compared with females. Age had positive correlation with regular smoking status indicating an increased probability of regular smoking at higher ages. Having a family member with cancer reduced the probability of regular or irregular smoking status.

Hookah smoking, gender, age and living status were the significant predictors identified by the algorithm. Similar to cigarette smoking, males showed higher probability of being heavy or light hookah smokers compared with females. An inverse relationship with age was shown for hookah smoking status indicating reduced probability of heavy or light hookah smoking at higher ages. Compared to living alone, those who live with their husband/wife or with others have higher probability of being heavy hookah smokers while those who live with their family have lower probability of being hookah smokers.

Discussion

The overall prevalence of cigarette smoking in our sample (874) was 59.1 % amongst males and 23.3 % amongst females; the overall prevalence of hookah smoking was 18.9 % amongst males and 23.1 % amongst females. These alarming figures are supported by high rates of heavy hookah smoking of 6.7 % amongst females and 6.8 % amongst

males. Moreover, 15.2 % of males and 2.2 % of females were regular smokers and hookah smokers (light or heavy).

A study published in September 2014 on data collected in early 2011 showed an overall prevalence of 32.3 % (54.9 % of males and 8.3 % of females) for all types of smoking [11]. Results of the national survey of 2004 showed prevalence of current cigarette smoking at 48.2 % amongst males and 5.1 % amongst females [5]. These results indicate that smoking rates in Jordan continues to increase in both genders reaching very high rates when compared to other countries in the region or with global tobacco statistics [16]. Results from Saudi Arabia show that overall prevalence of current smoking was 21.1 % for males and 0.9 % for females [12]. Overall prevalence of current smoking in Morocco was 31.5 % for males and 3.1 % for females [15].

The smoking rates in Jordan amongst men have reached figures equal to the highest reported in the world (i.e. from Armenia, Indonesia and Russia). As figures for women continue rising, they are approaching those reported from countries like Andorra, Austria and Belgium (i.e. prevalence of 25 % or more) [16]. The smoking rates in Jordan are expected to be a major contributor to the existing high incidence of chronic illnesses (e.g. ischemic heart disease, cancer, stroke and type 2 diabetes mellitus) [27]. In 2006, deaths from heart disease and stroke (ICD-10 codes I00–I99) accounted for one-third of mortalities in Jordan followed by malignant neoplasms (13 %), with lung cancer being the leading cause of cancer deaths [9].

Recent systematic review on global burden of hookah smoking concluded that hookah smoking rates are increasing in the world, particularly in the Middle Eastern countries [2]. Jordan’s current hookah smoking rates of 18.9 % amongst males and 23.1 % amongst females are much higher than other rates reported from the Middle East: Pakistan (6 %); Arabian Gulf region (4 %–12 %); Australia (11 % in Arabic-speaking adults); Syria (9 %–12 %); and Lebanon (15 %). Failure of the Jordanian Government to limit the number of licenses for cafés/shops serving hookah and low affordable prices for tobacco products could contribute to the growing burden of smoking in Jordan [20].

The age groups with the highest prevalence of regular cigarette smoking were the 35–44 years for males and 45–54 years for females. These results are consistent with previous studies from Jordan [5, 11] and Kuwait [14]. The highest rates for smoking in Morocco were for the 30–39 age group these are close to Jordan’s rates. Yet, the highest rates for Moroccan females were in the 20–29 years age group, which is younger than figures reported in our study [15]. In our study, females within the 25–34 years age group had the highest prevalence of light or heavy hookah

Table 3 Perceptions and beliefs related to cigarettes and hookah smoking by smoking status

	Cigarette smokers			Hookah smokers			Cigarette and hookah smokers			Ex-smokers			Never smoker	
	Total	Regular	Irregular	Total	Heavy	Light	Total	Regular and heavy	Regular and light	Total	Regular	Irregular	Total	Percent
		%	%		%	%		%	%		%	%		%
<i>Smoking causes early death</i>														
S-agree/agree	170	56.4 %	54.7 %	109	62.5 %	63.7 %	39	64.7 %	65.1 %	185	57.3 %	65.1 %	275	85.1 %
Neutral	64	22.0 %	17.0 %	29	12.5 %	18.5 %	12	11.8 %	23.3 %	56	19.1 %	15.1 %	26	8.0 %
S-disagree/disagree	69	21.6 %	28.3 %	34	25.0 %	17.7 %	9	23.5 %	11.6 %	70	23.6 %	19.8 %	22	6.8 %
P value	0.000			0.016			0.016			0.000				
<i>Smoking lowers tension or anger</i>														
S-agree/agree	223	76.5 %	58.5 %	112	75.0 %	61.8 %	48	82.4 %	79.1 %	199	65.8 %	59.3 %	76	23.6 %
Neutral	29	8.0 %	17.0 %	24	6.3 %	17.1 %	5	0.0 %	11.6 %	32	8.9 %	14.0 %	56	17.4 %
S-disagree/disagree	52	15.5 %	24.5 %	35	18.8 %	21.1 %	7	17.6 %	9.3 %	80	25.3 %	26.7 %	190	59.0 %
P value	0.000			0.000			0.000			0.000				
<i>Accept a smoking family member</i>														
S-agree/agree	33	10.8 %	11.5 %	26	14.9 %	16.1 %	10	18.8 %	16.7 %	32	9.9 %	11.6 %	11	3.4 %
Neutral	75	23.6 %	30.8 %	37	25.5 %	21.2 %	11	12.5 %	21.4 %	69	21.2 %	25.6 %	35	10.9 %
S-disagree/disagree	194	65.6 %	57.7 %	102	59.6 %	62.7 %	37	68.8 %	61.9 %	207	68.9 %	62.8 %	274	85.6 %
P value	0.000			0.000			0.000			0.000				
<i>Smoking reduces weight</i>														
No	111	35.5 %	50.0 %	75	50.0 %	46.1 %	18	31.3 %	32.5 %	120	39.0 %	45.1 %	150	48.9 %
Yes	181	64.5 %	50.0 %	84	50.0 %	53.9 %	38	68.8 %	67.5 %	175	61.0 %	54.9 %	157	51.1 %
P value	0.001			0.740			0.740			0.059				
<i>Smoking harms health</i>														
S-agree/agree	253	88.9 %	88.2 %	139	86.0 %	88.1 %	47	80.0 %	94.6 %	254	89.9 %	86.1 %	285	96.9 %
Neutral	20	6.8 %	7.8 %	12	6.0 %	8.3 %	3	6.7 %	5.4 %	18	6.3 %	6.3 %	5	1.7 %
S-disagree/disagree	12	4.3 %	3.9 %	8	8.0 %	3.7 %	2	13.3 %	0.0 %	14	3.9 %	7.6 %	4	1.4 %
P value	0.006			0.018			0.018			0.000				
<i>Think that smoking Nargila does not harm</i>														
S-agree/agree	34	12.3 %	7.4 %	30	14.5 %	18.3 %	12	29.4 %	16.7 %	30	9.7 %	10.2 %	18	5.9 %
Neutral	45	11.9 %	29.6 %	34	23.6 %	17.5 %	6	5.9 %	11.9 %	39	9.7 %	20.5 %	13	4.3 %
S-disagree/disagree	218	75.7 %	63.0 %	111	61.8 %	64.2 %	41	64.7 %	71.4 %	236	80.6 %	69.3 %	274	89.8 %
P value	0.000			0.000			0.000			0.000				
<i>Smoking Nargila harms less than cigarettes</i>														
S-agree/agree	49	16.8 %	17.0 %	53	34.5 %	29.1 %	14	23.5 %	24.4 %	44	15.6 %	12.8 %	29	9.5 %
Neutral	43	13.0 %	22.6 %	23	14.5 %	12.8 %	6	5.9 %	12.2 %	38	11.3 %	16.3 %	29	9.5 %
S-disagree/disagree	199	70.2 %	60.4 %	96	50.9 %	58.1 %	38	70.6 %	63.4 %	216	73.1 %	70.9 %	247	81.0 %
P value	0.060			0.000			0.000			0.378				

Table 3 continued

	Cigarette smokers			Hookah smokers			Cigarette and hookah smokers			Ex-smokers			Never smoker	
	Total	Regular	Irregular	Total	Heavy	Light	Total	Regular and heavy	Regular and light	Total	Regular	Irregular	Total	Percent
<i>Smoking Nargila is socially acceptable more than cigarettes</i>														
S-agree/agree	169	55.4 %	70.0 %	133	75.0 %	78.4 %	43	77.8 %	70.7 %	164	53.5 %	57.1 %	173	55.6 %
Neutral	53	19.0 %	14.0 %	23	14.3 %	12.9 %	8	11.1 %	14.6 %	56	20.3 %	14.3 %	46	14.8 %
S-disagree/disagree	70	25.6 %	16.0 %	16	10.7 %	8.6 %	8	11.1 %	14.6 %	81	26.3 %	28.6 %	92	29.6 %
P value	0.325			0.000			0.000			0.798				

smoking, while the same age group had the highest prevalence for heavy hookah smoking amongst males.

Another issue detected in this study, and previously reported in the region, was smoking during pregnancy [2]. These figures indicate that special attention should be paid to smoking during pregnancy and to provide more support to pregnant smokers to reduce smoking-related maternal and foetal complications.

Leisure and imitation were the most common reasons reported for cigarette or hookah smoking. Results from Kuwait show that relief from boredom, relaxation and concentration at work were the most commonly reported reasons for smoking [14]; the most commonly reported reasons from Saudi Arabia were psychological relief and boredom [12]. Studies have shown that boredom can lead to serious problems (e.g. Internet, smoking or drug addictions). But, leisure is also regarded as an important way for people to maintain and improve their health. Leisure reduces one's own stress and help others to cope with stress [23]. Future health promotion in Jordan and the region targeting smoking cessation should also include advice for people on more beneficial use of their time, especially how they can fill their leisure time doing something meaningful for themselves and their communities.

Health-related issues and perceived risk of smoking were the most commonly reported reasons for smoking cessation; similar to reports from Kuwait [14] and Saudi Arabia [12]. This has been attributed to the 'illness behavioural model', where having a disease or illness leads to changes in the individual. Health-care professionals could play a major role in counselling their patients concerning smoking risk and potential positive outcomes of smoking cessation [7].

Similar to other studies from the Middle East [3], participants agreed that smoking hookah is more socially acceptable more than smoking cigarettes. Nevertheless, a large proportion of participants were aware of the harmful effects of hookah smoking, unlike reports in other studies [19]. Although smoking rates were very high amongst Jordanian participants, participants had positive perceptions concerning family members' smoking status; a high proportion of parents strongly disagree/disagree on their son or daughter smoking cigarettes or hookah. Similar to the above finding, recent systematic review on attitudes towards hookah smoking concluded people in the Middle East and people of Middle Eastern descent in Western countries are aware of the potential health hazards of hookah smoking. It also revealed that hookah smoking was generally socially acceptable in the Middle East, which is not consistent with our findings. Further research is needed to understand the negative attitudes toward smoking in the presence of Jordan's high smoking rates [3].

Table 4 Attitudes of parents towards smoking habit of their sons and daughters

	Cigarette smokers			Hookah smokers			Cigarette and hookah smokers			Ex-smokers			Never smoker	
	Total	Regular	Irregular	Total	Heavy	Light	Total	Regular and heavy	Regular and light	Total	Regular	Irregular	Total	Percent
<i>Accept a smoking family member</i>														
S-agree/agree	33	10.8 %	11.5 %	26	14.9 %	16.1 %	10	18.8 %	16.7 %	32	9.9 %	11.6 %	11	3.4 %
Neutral	75	23.6 %	30.8 %	37	25.5 %	21.2 %	11	12.5 %	21.4 %	69	21.2 %	25.6 %	35	10.9 %
S-disagree/disagree	194	65.6 %	57.7 %	102	59.6 %	62.7 %	37	68.8 %	61.9 %	207	68.9 %	62.8 %	274	85.6 %
P value	0.000			0.000			0.000			0.000				
<i>Accept a hookah smoking family member</i>														
S-agree/agree	43	14.1 %	15.4 %	49	36.2 %	27.1 %	15	29.4 %	24.4 %	47	14.5 %	17.6 %	18	5.6 %
Neutral	72	21.8 %	34.6 %	45	23.4 %	28.8 %	12	17.6 %	22.0 %	62	19.9 %	21.2 %	40	12.4 %
S-disagree/disagree	185	64.1 %	50.0 %	71	40.4 %	44.1 %	31	52.9 %	53.7 %	197	65.6 %	61.2 %	264	82.0 %
P value	0.000			0.000			0.000			0.010				
<i>Parents: accept that your son smoke cigarettes</i>														
S-agree/agree	12	5.7 %	8.8 %	9	18.8 %	4.3 %	4	27.3 %	4.0 %	12	7.0 %	3.3 %	4	2.2 %
Neutral	23	10.8 %	17.6 %	16	18.8 %	14.5 %	4	9.1 %	12.0 %	24	9.8 %	16.4 %	8	4.3 %
S-disagree/disagree	157	83.5 %	73.5 %	76	62.5 %	81.2 %	28	63.6 %	84.0 %	168	83.2 %	80.3 %	174	93.5 %
P value	0.028			0.000			0.000			0.002				
<i>Parents: accept son smoking hookah</i>														
S-agree/agree	13	7.4 %	2.9 %	11	21.9 %	6.2 %	1	11.1 %	0.0 %	16	6.6 %	9.7 %	0	0.0 %
Neutral	18	6.8 %	20.0 %	14	12.5 %	15.4 %	4	11.1 %	12.5 %	21	6.6 %	17.7 %	9	5.0 %
S-disagree/disagree	166	85.8 %	77.1 %	72	65.6 %	78.5 %	28	77.8 %	87.5 %	177	86.8 %	72.6 %	172	95.0 %
P value	0.006			0.000			0.000			0.002				
<i>Parents: accept daughter smoking cigarettes</i>														
S-agree/agree	5	2.5 %	2.8 %	7	12.5 %	4.7 %	1	11.1 %	0.0 %	6	2.6 %	3.3 %	1	0.6 %
Neutral	18	7.4 %	16.7 %	9	15.6 %	6.3 %	2	11.1 %	4.2 %	17	5.8 %	13.1 %	1	0.6 %
S-disagree/disagree	175	90.1 %	80.6 %	80	71.9 %	89.1 %	30	77.8 %	95.8 %	192	91.6 %	83.6 %	179	98.9 %
P value	0.000			0.000			0.000			0.017				
<i>Parents: accept daughter smoking hookah</i>														
S-agree/agree	5	2.5 %	2.8 %	7	12.5 %	4.7 %	0	0.0 %	0.0 %	5	1.9 %	3.3 %	1	0.5 %
Neutral	21	8.6 %	19.4 %	11	15.6 %	9.4 %	3	22.2 %	4.2 %	23	7.1 %	19.7 %	7	3.8 %
S-disagree/disagree	173	89.0 %	77.8 %	78	71.9 %	85.9 %	30	77.8 %	95.8 %	188	91.0 %	77.0 %	178	95.7 %
P value	0.014			0.001			0.001			0.019				
<i>Sons and daughters: father accepts them to smoke hookah</i>														
Don't know	16	10.3 %	6.7 %	13	3.4 %	13.6 %	4	7.7 %	9.4 %	12	7.5 %	8.7 %	15	9.0 %
No	103	61.0 %	66.7 %	63	48.3 %	55.7 %	23	38.5 %	56.3 %	96	63.2 %	63.0 %	132	79.5 %
Yes	47	28.7 %	26.7 %	41	48.3 %	30.7 %	18	53.8 %	34.4 %	44	29.2 %	28.3 %	19	11.4 %

Table 4 continued

	Cigarette smokers			Hookah smokers			Cigarette and hookah smokers			Ex-smokers			Never smoker	
	Total	Regular	Irregular	Total	Heavy	Light	Total	Regular and heavy	Regular and light	Total	Regular	Irregular	Total	Percent
<i>P</i> value	0.039			0.000			0.000			0.022				
<i>Sons and daughters: mother accepts them to smoke hookah</i>														
Don't know	14	9.7 %	3.3 %	8	0.0 %	9.1 %	1	0.0 %	3.3 %	14	9.5 %	8.7 %	13	7.9 %
No	107	63.4 %	73.3 %	72	51.7 %	64.8 %	27	38.5 %	73.3 %	96	61.9 %	67.4 %	134	81.2 %
Yes	43	26.9 %	23.3 %	37	48.3 %	26.1 %	15	61.5 %	23.3 %	41	28.6 %	23.9 %	18	10.9 %
<i>P</i> value	0.054			0.000			0.000			0.080				
<i>Sons and daughters: father accepts them to smoke cigarettes</i>														
Don't know	6	2.8 %	6.3 %	11	3.7 %	12.0 %	1	0.0 %	3.3 %	7	2.8 %	8.3 %	6	3.6 %
No	136	75.7 %	84.4 %	88	81.5 %	79.5 %	31	66.7 %	76.7 %	117	73.4 %	77.1 %	152	91.6 %
Yes	34	21.5 %	9.4 %	11	14.8 %	8.4 %	10	33.3 %	20.0 %	33	23.9 %	14.6 %	8	4.8 %
<i>P</i> value	0.000			0.026			0.026			0.000				
<i>Sons and daughters: mother accepts them to smoke cigarettes</i>														
Don't know	8	4.2 %	6.3 %	10	7.4 %	9.4 %	3	8.3 %	6.7 %	7	3.7 %	6.4 %	6	3.6 %
No	136	76.8 %	84.4 %	94	77.8 %	85.9 %	32	58.3 %	83.3 %	120	75.0 %	83.0 %	152	92.1 %
Yes	30	19.0 %	9.4 %	8	14.8 %	4.7 %	7	33.3 %	10.0 %	28	21.3 %	10.6 %	7	4.2 %
<i>P</i> value	0.000			0.109			0.109			0.001				
<i>Being a smoker make family member smoke</i>														
S-agree/agree	133	51.0 %	28.1 %	50	46.2 %	52.1 %	27	63.6 %	48.8 %	125	51.9 %	49.2 %	3	42.9 %
Neutral	54	18.1 %	31.3 %	21	34.6 %	16.4 %	10	9.1 %	22.0 %	43	16.4 %	21.3 %	2	28.6 %
S-disagree/disagree	88	30.9 %	40.6 %	28	19.2 %	31.5 %	15	27.3 %	29.3 %	76	31.7 %	29.5 %	2	28.6 %
<i>Smoking harms others around me</i>														
S-agree/agree	239	88.8 %	83.3 %	81	92.3 %	81.4 %	45	90.9 %	87.5 %	210	89.4 %	83.1 %	4	80.0 %
Neutral	22	7.5 %	13.3 %	8	7.7 %	8.6 %	4	9.1 %	7.5 %	17	6.7 %	8.5 %	0	0.0 %
S-disagree/disagree	10	3.7 %	3.3 %	7	0.0 %	10.0 %	2	0.0 %	5.0 %	12	3.9 %	8.5 %	1	20.0 %

Increasing age, male gender, and living alone were statistically significant predictors of smoking in our study. Similar findings were identified in a study from Saudi Arabia where increasing age, male gender, being married, higher education and higher income were associated with positive smoking status [12].

In conclusion, smoking has reached alarming rates for cigarettes and hookah smoking and for both genders. Regardless of smoking status, people were aware of cigarettes and hookah health risks and had negative perceptions toward smoking. There is an urgent need for a comprehensive national programme in Jordan to target the growing burden of smoking. Suggestions on better use of leisure time should be included in such programmes.

Compliance with ethical standards

Conflict of interest All authors declare no conflict with interest.

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