Prevalence of nicotine dependence among university students in Jordan: a cross-sectional study

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ABSTRACT

Tobacco epidemic is one of the biggest public health threats the world has ever encountered. The objective of this study was to identify the prevalence of nicotine dependence among university students in Jordan and assess factors associated with this dependence.

A cross-sectional study using simple random sampling was conducted among university students from 3 public and 3 private universities selected for their convenience from central, middle, and east Jordan via administering a questionnaire between October 2016 and January 2017. The total number of participants was 892.

The overall nicotine dependence was 51.2%. Correlates to nicotine dependence were studying at an undergraduate level (OR=3.6; 95% CI: 1.4-8.1); studying humanities (OR=1.73; 95% CI: 1.2-2.1); existing of a smoking family member (OR=1.63; 95% CI: 1.5-1.9); starting smoking before age of 15 years (OR=1.60; 95% CI: 1.2-2.1); water pipe smoking (OR=1.48; 95% CI: 1.1-2.0); and studying at governmental universities (OR=1.36; 95% CI: 1.0-1.8).

Several socio-demographic characteristics had an impact on nicotine dependence. Future research is necessary to further improve our understanding of motives for smoking and dependence.

INTRODUCTION

The tobacco epidemic is one of the biggest public health threats the world has ever encountered, killing approximately 6 million people a year (WHO, 2016). It has been reported that all forms of tobacco are harmful; however, cigarette and waterpipe smoking are the most prevalent forms (Fagerström & Eissenberg, 2012; Fagerström, 2014).

The research regarding the prevalence of smoking among university students in many countries is copious; however, research regarding the prevalence of nicotine dependence among university students is lacking. A study conducted on 2091 students at 5 universities in the USA reported an overall tobacco dependence of 45% (Halperin et al., 2009). In a study conducted among male university students at King Faisal University in Saudi Arabia (KSA), 47.0% of students had a nicotine dependence score of ≥ 6 (Al Mohamed &Amin, 2010).

A study among university students in Jordan reported that the prevalence of cigarette smoking was 29% and the prevalence of waterpipe smoking was 59% among males and 13% among females (Khabour et al., 2012). In Palestine, 34.7% of university students were cigarette or waterpipe smokers (Musmar, 2012). The overall prevalence of smoking was 14.5% among undergraduate students in the KSA (Mandil et al., 2011), 18.2% among nursing and physiotherapy students in Spain (Fernández et al., 2015), 20.4% among medical students in Italy (Saulle et al., 2013), 29.5% in Ethiopia (Eticha & Kidane, 2014), and 35% in Romania (Didilescu et al., 2014). Moreover, the prevalence of smoking among university students in Kuwait was 31% among males and 3% among females (Waheedi et la., 2011).

Tobacco smoke contains thousands of toxic and carcinogenic chemicals as reported by Fagerström (2014). Data on the prevalence of smoking dependence are essential to allow decision makers to formulate effective policies to address smoking. In Jordan, studies on smoking dependence are lacking. Therefore, this study aimed to identify the prevalence of nicotine addiction among Jordanian university students, determine the association between socio-demographic characteristics and smoking habits, and assess the intentions for smoking cessation among university students in Jordan.

MATERIALS AND METHODS

Study Design and Participants

A cross-sectional study utilizing students from 3 public and 3 private Jordanian universities was used. Universities were selected from the total ten public and twenty private universities registered in Jordan. Selected universities were those with the largest number of students. Within each university, a list of classes considered as university requirements were identified and a sample of these classes was selected. All students in these classes who were officially enrolled at the selected university, were 18 years or older, smoked at least 100 cigarettes in their lifetime, self-reported themselves as "current cigarettes smokers", and were not seeking smoking cessation treatment were eligible to participate in the study. Eligible participants were asked to participate in the study. Once approved, students were asked to complete a self-administered anonymous questionnaire. A total of 1,400 students from the selected universities completed the questionnaire.

Ethical Approval

Ethical approval was obtained from the Institutional Review Board (IRB) at King Abdullah University Hospital, and the study was designed according to the principles of the Helsinki Declaration. Informed consent was obtained from all participants.

Study Instruments and Variables Assessment

The questionnaire consisted of two sections: socio-demographics and Fagerström Test for Nicotine Dependence (FTND), which is a standard international instrument for assessing the intensity of physical dependence on nicotine (Fagerström, 2014). FTND provides an ordinal measure of nicotine dependence related to cigarette smoking that evaluate the quantity of cigarette consumption, the compulsion smoke, and nicotine dependence (Heatherton et al., 1991). Validity and reliability of FTND has been reported (Pomerleau et al., 1994; Payneet al., 1994).

Instrument Translation

FTND was translated into Arabic language by two independent professional translators and then back-translated into English language. Subject matter experts reviewed both versions and minor language changes were made. FTND was then pilot tested among 30 participants and revealed a Cronbach's alpha of 0.82.

Scoring of the FTND

FTND standardized scoring schema was utilized (yes (scored as "1") and no as "0"), and multiple-choice items were scored from 0 to 3. The items were summed to yield a total score ranging from 0 to10. The higher the total Fagerström score, the more intense is the person's physical dependence on nicotine. Participants were considered to have moderate to high nicotine dependence with FTND

scores ≥5 (Heatherton et al., 1991).

Statistical Analysis

Statistical analysis was performed using SPSS v.20.0 (SPSS, Inc., Chicago, IL). Frequency distribution and descriptive data were produced. The chi-square test was used to compare the dependence level of subgroups based on the students' characteristics. Additionally, all variables revealed a P value ≤ 0.25 in the univariate analysis were tested for their association with nicotine dependence via binary logistic regression analysis using backward stepwise selection. A P value < 0.05 was considered statistically significant.

RESULTS

A total of 892 students responded to the questionnaire and participated in the study giving a response rate of (63.7%). Mean (SD) age was 22.2 (±3.71) years. Approximately, three quarters (75.3%) of the students were males, and 56.6% were studying humanities. Table 1 shows the participants' characteristics. A total of 380 students (42.6%) started smoking between the ages of 15 and 18 years. A total of 71.4% of females were waterpipe (shisha) smokers compared with 68.6% of the males. Approximately 60% of the students had future intentions to quit cigarette smoking (61.4% and 59.8% of the females and males, respectively).

About half of participants were categorized by FNDT to have low (FNDT score ≤ 2, 24.4%) or low to moderate (FNDT score 3-5, 24.3%). The rest had either moderate (5-7, 45.0%) or high (8-10, 6.3%) dependence. Interestingly, differences in the dependence levels were statistically significant for all characteristics except for gender. Table 2 shows differences in the nicotine dependence levels according to participants' characteristics.

As shown in Table 3, 52.4% of males had FNDT score ≥ 5 compared to 47.7% among females; however, this difference was statistically not significant. Table 3 shows the overall nicotine dependence level according to the studied characteristics.

In the multivariate analysis, initiating cigarette smoking before the age of 18, having family members who smoke, smoking waterpipe, studying in a public university, being in an undergraduate level education and being enrolled in humanities colleges significantly predicted nicotine addiction (FNDT score ≥5) (Table 4).

TABLE 1. Characteristics of study population (n=892)

CHARACTERISTICS	N (%)
Gender	
Male	672 (75.3)
Female	220 (24.7)
Faculty type	
Sciences	396 (44.4)
Humanities	496 (55.6)
Level/year of study	
First year	91 (10.2)
Second year	192 (21.5)
Third year	224 (25.1)
Fourth year	271 (30.4)
Fifth year	84 (9.4)
Postgraduate	30 (3.4)
Age of smoking initiation/year	
< 15	154 (17.3)
15-18	380 (42.6)
> 18	358 (40.1)
Daily pocket money/JOD	
< 3	124 (13.9)
3-5	439 (49.2)
> 5	329 (36.9)
University	
Public	648 (72.6)
Private	244 (27.4)
Secondary school	
Public	684 (76.7)
Private	208 (23.3)
Family smoking	
Yes	692 (77.7)
No	200 (22.3)
A family member works in health sector	
Yes	315 (35.3)
No	577 (64.7)
Waterpipe (shisha) smoking	
Yes	618 (69.3)
No	274 (30.7)
Intention to stop smoking	
Yes	541 (60.7)
No	351 (39.3)

DISCUSSION

The current study aimed to assess nicotine dependence among university students in Jordan. The overall nicotine dependence (FNDT score ≥5) among students among males and females was 51.2%. This is consistent with results for tobacco dependence among university students in the KSA (47.0%) (Al Mohamed &Amin, 2010) and the USA (45%) (Halperin et al., 2009). Conversely, the FNDT score was low for 85.7%, moderate for 13.7% and high for only 0.6% of smoking university students in Cameroon (Mbatchou et al., 2013). Differences in socio-cultural, climate, and economic factors might explain the variations in the studies' findings.

TABLE 2. Level of nicotine dependence according to socio-demographic characteristics of participants (n=892)

CH.CH	LEVEL OF NICOTINE DEPENDENCE %				
	Low	Low-moderate	Moderate	High	P value*
Gender					0.173
Male	22.6	25.0	45.8	6.5	
Female	30.0	22.3	42.3	5.5	
Age of smoking initiation					0.004
<15 years	20.8	24.7	44.2	10.4	
15-18 years	21.3	22.1	49.5	7.1	
> 18 years	29.3	26.5	40.5	3.6	
Type of faculty					0.002
Scientific	29.8	25.5	39.6	5.1	
Humanities	20.2	23.4	49.2	7.3	
Study level					0.003
Undergraduate	23.5	24.2	45.9	6.3	
Postgraduate	50.0	26.7	16.7	6.7	
Daily pocket money/JOD					0.024
<3	32.3	28.2	33.9	5.6	
3-5	20.3	25.7	48.1	5.9	
> 5	27.1	21.0	45.0	7.0	
Waterpipe smoking					0.006
Yes	23.9	22.0	46.3	7.8	
No	25.5	29.6	42.0	2.9	
Family smoking					0.044
Yes	23.7	22.8	46.4	7.1	
No	27.0	29.5	40.0	3.5	

It is commonly believed that an earlier age at smoking onset is one of the strongest factors for progression to increased levels of nicotine dependence in adulthood (Morrell et al., 2011). The age at which students started smoking was an important predictor of nicotine dependence in our sample, revealing that students who started smoking before 18 years of age had higher nicotine dependence levels. This result is consistent with the results of a study conducted in the USA that reported that the early onset of smoking is associated with a higher risk of nicotine dependence later (Kendler et al., 2013).

Our results also confirm the reports of Haddad and Malak (2002) regarding early onset of smoking among university students in Jordan, and results of Kheirallah et al. (2014) who found that early initiation of tobacco use starts with waterpipe smoking. Similar results for early smoking were observed in a sample of 1,072 Egyptian university students, of whom 34.2% initiated smoking before the age of 15 years (El-Sharkawy, 2011) and among university students in the KSA who began smoking before the age of 16 years (Almutairi, 2014). Furthermore, most nursing and physiotherapy undergraduate students in Spain started smoking before commencing their university studies (Fernández et al., 2015). Therefore, health education campaigns addressing the adverse health effects of smoking should purposely target people younger than 15 years old. Furthermore, laws and regulations banning the sale of cigarettes to adolescents should be activated.

In our study, the presence of a family member who smokes was correlated with nicotine dependence. This result is consistent with the results for Saudi college students of both genders: having a family member who smoked was a predictor of smoking in other members of the family (Mandil et al., 2011; Mandil et al., 2010). A similar correlation was reported in studies from Cameroon (Mbatchou et al., 2013), the UAE (Mandil et al., 2005), Spain (Fernández et al., 2015), and Bahrain (Al Haddad & Hamadeh, 2003). When parents are the ones who smoke, it is very difficult for them to convince their children to avoid or stop doing something that they see their parents do. Brothers and sisters who smoke also encourage smoking among their siblings.

Interestingly, our results showed that the type of college was a predictor of nicotine dependence, indicating that students in the arts and humanities had a higher dependence level than those in scientific colleges. Similarly, students in

TABLE 3. Differences in the overall nicotine dependence score according to socio-demographic characteristics of participants (n=892)

	NICOTINE DEPENDENCE				
	FNDT ≤4		FNDT ≥5		
Risk factor		**(%)**	**n**	**(%)**	**p value***
Gender					
Male	320	(47.6)	352	(52.4)	0.231
Female	115	(52.3)	105	(47.7)	
Age of smoking initiation (years)					
<15	70	(45.5)	84	(54.5)	
15-18	165	(43.4)	215	(56.6)	0.002
> 18	200	(55.9)	158	(44.1)	
Type of faculty					
Scientific	219	(55.3)	177	(44.7)	0.001
Humanities	216	(43.5)	280	(56.5)	
Study level					
Undergraduate	412	(47.8)	450	(52.2)	0.002
Postgraduate	23	(76.7)	7	(23.3)	
Daily pocket money/JOD					
<5	75	(60.5)	49	(39.5)	
3-5	202	(46.0)	237	(54.0)	0.016
> 5	158	(48.0)	171	(52.0)	
Waterpipe smoking					
Yes	248	(46.0)	334	(54.0)	0.012
No	151	(55.1)	123	(44.9)	
Family smoking					
Yes	322	(46.5)	370	(53.5)	0.013
No	113	(56.5)	87	(43.5)	

** p value calculated using Pearson's chi square (p<0.05 is considered significant)*

arts and humanities colleges had a higher prevalence of smoking than students in scientific colleges in the KSA (Al Mohamed, Amin 2010) and Palestine (Musmar, 2012). These results are supported by the notion that students from scientific colleges are more committed to their studies than to engaging in unhealthy recreational behavior, as stated by university students from Iran, 42.5% of whom perceived enjoyment as a reason for waterpipe smoking (Sabahy et al., 2011). A similar perception was reported among university students in Cameroon (Mbatchou et al., 2013).

Concerning the type of university, our results revealed that students at public universities were more dependent on nicotine than students at private ones. However, Lebanese students at private universities had almost double the odds of smoking dependence of their counterparts at public universities (Salameh et al., 2014). These contradictory results may refer to socio-cultural and economic differences between Jordan and Lebanon. In our study, undergraduate students were more prone to nicotine dependence than postgraduate students. This trend was also reported by Al Mohamed and Amin (2005) among Saudi university students: only 3% of smokers were in their fifth year of study, compared with the approximately 30% prevalence of smoking among first-year students. It seems that students in the early stages of adulthood are more likely to smoke than those in later stages, who are more mature.

When asked about their intentions to stop smoking in future, 60.2% of the participants in our study intended to quit. This result is very close to the results reported in the study from Cameroon, in which 63.5% of students had similar intentions (Mbatchou et al., 2013). Moreover, approximately 70% of the participants in the current study were waterpipe smokers, reflecting a dramatic increase in the magnitude of waterpipe smoking, as reported by Jawad et al. (2013), and indicating that the prevalence of waterpipe smoking prevalence is currently more than double that of cigarette smoking and that Middle Eastern ethnicity is a significant predictor of waterpipe use.

CONCLUSION

The overall nicotine dependence among Jordanian university students was 51.2%, indicated by a FNDT score ≥5.

Limitations

This study has some limitations may affect the

TABLE 4. The multivariate logistic regression analysis of factors associated with nicotine dependence (FNDT score ≥5; n=892)

Variable	OR	95% CONF. INTERVAL		p value
		Lower	Upper	
Age of smoking initiation (years) <15 15-18 > 18	 1.60 1.3 1*	 1.2 1.6	 2.1 2.3	 p<0.001
Having a family member who smokes Yes No	 1.63 1*	1.5	1.9	0.005
Waterpipe smoking Yes No	 1.48 1*	1.1	2.0	0.008
Type of university Public Private	 1.36 1*	1.0	1.8	0.048
Study level Undergraduate Postgraduate	 3.55 1*	1.4	8.1	0.007
Type of college Humanities Scientific	 1.73 1*	1.2	2.1	p<0.001

** Reference category*

accuracy of the results; specifically, the snapshot effect of its cross-sectional design and the use of a single tool to assess nicotine dependence. Therefore, cohort and longitudinal studies and data supported by laboratory investigations of nicotine levels could reveal more precise results. Moreover, one of the limitations of this study also included using the self-administered questionnaire which might produce information bias.

Recommendations

Smoking cessation treatments represent the most cost-effective of all health care interventions. Although the greatest benefit accrues from ceasing smoking when young, even quitting in middle age limits the health risks associated with smoking. To improve smoking cessation rates, effective behavioral and pharmacological treatments, coupled with professional counselling and advice, are required. Since smoking duration is the principal risk factor for smoking-related morbidity, the treatment goal should be directed towards early cessation and the prevention of relapse.

Therefore, intensive antismoking programs for both genders starting in primary schools about smoking and its adverse effects should target students by integrating these health education programmes into school and university curricula, in addition to family supervision of the behavior of children's peers and friends, are crucial for increasing awareness of the harmful impact of smoking and reducing its prevalence. Furthermore, not having excess pocket money, paying attention to students' work and club participation and encouraging participation in sports and cultural activities are all important for diverting students toward healthy behaviors.

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Conflict of Interest

None of the authors have any conflict of interest to disclose.

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