RESEARCH ARTICLE

Smoking habits, attitudes and determinants among university aged population: Comparison of pharmacy and non-pharmacy students from a private university in Lebanon

Mohammed Assi [1] , Nehmatalla Onaissy [1] , Fouad Sakr [1,2] , Michelle Cherfan [1,3,4] , Zeina Akiki [1,4] ,
Mariam Dabbous [1,5] , Marwan Akel [1,4,6] , Jihan Safwan[1]

[1] Lebanese International University, School of Pharmacy, Beirut, Lebanon
[2] Université Paris-Est Créteil, Institut Mondor de Recherche Biomédicale, Créteil, France
[3] Abu Dhabi University, College of Health Sciences, United Arab Emirates
[4] INSPECT-LB (Institut National de Santé Publique, d'Épidémiologie Clinique et de Toxicologie-Liban), Beirut, Lebanon
[5] Lebanese International University, School of Education, Beirut, Lebanon
[6] International Pharmaceutical Federation (FIP), The Netherlands

Correspondence
Jihan Safwan
School of Pharmacy
Lebanese International University
Mussaitbeh
Beirut
Lebanon
jihan.safwan@liu.edu.lb

Abstract

Objective: To assess the prevalence of smoking among pharmacy students and to analyse how smoking affects pharmacy students' attitudes towards smoking cessation practices. **Methods:** An online questionnaire was distributed to students from five schools at the Lebanese International University as part of a cross-sectional study. It looked into sociodemographic identities, smoking attitudes and beliefs, and pharmacy students' smoking cessation consultation procedures. **Results:** A total of 1372 students were enrolled in the study (159 pharmacy students and 1213 non-pharmacy students). Almost half of the participants (45.0%) were current smokers, with males accounting for the majority. There was a substantial correlation between knowledge of smoking's health implications and smoking status ($p = 0.021$). Nonsmoking pharmacy students were more likely than smokers to offer cessation advice ($p < 0.0001$). **Conclusion:** A high smoking prevalence was determined among students, which should be addressed by boosting tobacco awareness efforts and enforcing strict anti-smoking policies on college premises.

Introduction

Tobacco is the single most preventable cause of death around the globe. It is the only legal product that kills half of its users (WHO, n.d.a). The tobacco epidemic is a devastating health related threat that is killing approximately eight million people a year worldwide (WHO, n.d.a). The 2004 Surgeon General's Report shows that smoking harms almost every organ of the body and can cause cancers of the lung, bladder, stomach, kidney, and larynx (CDCTobaccoFree, 2018). According to the World

Health Organization (WHO), the prevalence of tobacco consumption reached 42.4% in 2018 (WHO, n.d.b).

Lebanon has one of the highest rates of smoking in the adult population globally, with consumption reaching 12.4 packs per person per month. These cigarette consumption rates rank among the highest in the world. According to the Tobacco Atlas, around 25% of deaths of those aged 30 years or older in Lebanon are attributed to smoking-related diseases (Salti *et al.*, 2014). Nearly nine out of ten

cigarette smokers first try cigarettes by the age of 18, and 98.0% first try smoking by the age of 26 (National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health, 2012). Unfortunately, an earlier age of initiation extends the potential period of smoking throughout the lifespan, and thus increases the risk and cumulative amount of tobacco used (National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health, 2012). Smoking among students is linked with male gender (Villanti *et al.*, 2011), presence of smoking peers or family members (Villanti *et al.*, 2011; Abu-elenin *et al.*, 2017), and stress (Bonilha *et al.*, 2013; Abu-elenin *et al.*, 2017). Other factors linked with smoking include poor academic performance (Nouira & Abedelaziz, 2018), lack of support from parents, and the accessibility of tobacco products (CDC, n.d.). In addition, university students consider smoking cigarettes and waterpipes as a mean to relieve stress, fill up free time, or to socialise (Akl *et al.*, 2013).

Owing to the considerable harm of tobacco, all health care professionals including pharmacists should be competent and well trained in offering cessation advice and facing the tobacco epidemic. Pharmacists are well positioned to offer cost effective smoking cessation advice with similar successful rates to those provided by other healthcare professionals (Tran *et al.*, 2002; McBane *et al.*, 2013; Shen *et al.*, 2014). However, pharmacists may lack the time and skills to offer such adequate services (McBane *et al.*, 2013) and as a result they may display inconsistencies while counseling their patients (Soubra & Issa, 2018).

Although smoking prevalence among healthcare professionals is expected to be low due to their wider medical knowledge, the prevalence of smoking among such population can be alarmingly high: 25.8% of medical students in Lebanon (Chidiac *et al.*, 2016) and 44.0% of healthcare professionals in Italy are smokers (Ficarra *et al.*, 2011). Such high percentage can be alarming since medical students who smoke are less likely to advise their patients to stop smoking and they are also less supportive to tobacco control policies (Chidiac *et al.*, 2016; Nemes-Nagy *et al.*, 2016).

A better understanding of the smoking patterns of university students is needed. Therefore, it is necessary to investigate the smoking habits and attitudes of university students. There is a lack of data regarding the prevalence of smoking among Lebanese pharmacists. The aim of this study is to assess the prevalence of smoking among pharmacy students, and to analyse how smoking affects the pharmacy student attitudes towards smoking cessation practices. This research can help pharmacy educators to compose better tobacco education standards

for students and enhance the role of the future pharmacists in dealing with the high prevalence of tobacco usage in society.

Methods

Study design and participants

This was a cross-sectional study, conducted through an online questionnaire on Google Forms. The survey was emailed to currently enrolled students at all Lebanese branches of the Lebanese International University (LIU). LIU is a private university that has nine branches all over Lebanon. It includes five schools: School of Arts and Sciences, School of Education, School of Business, School of Engineering, and School of Pharmacy. Participants from all five different schools within the university were included. Data collection was done from 4 May 2021 to 20 July 2021. A minimum sample size of 319 persons was needed based on a 95% confidence level with a margin of error of 5%. The questionnaire began with an explanation of the study's scope and purpose. Participants were informed that taking part in the study was completely voluntary, and that their responses would be kept anonymous and confidential. The completion of the entire questionnaire was regarded as informed consent to participate. The Institutional Review Board of the School of Pharmacy at the Lebanese International University approved the study.

Data collection

The questionnaire consisted of 11 sections covering sociodemographic information, attitudes and beliefs regarding smoking, and the pharmacy student practices regarding smoking cessation consultation. The sociodemographic information included data such as age, sex, family income, place of residence, school enrolled in, employment, family/friends smoking status, alcohol/coffee consumption, exercise, student's own smoking status, and duration of smoking. In order to inquire about the attitudes and beliefs regarding smoking and tobacco the authors asked the students questions like: 'do you think it is safe to smoke for a year, then quit?', 'do you consider a waterpipe users as smokers?' The final part of the questionnaire was specific for pharmacy students and investigated their knowledge and practices while counseling patients to quit smoking.

Statistical analysis

Data were analysed with IBM SPSS version 21. Association between risk factors and smoking status (never smoker, current smoker, ex-smoker) was done using multinomial logistic analysis ('never smoker' was selected as the dependent reference category). Association between attitudes and smoking status were analysed with the Pearson Chi square tests. *P*-values of < 0.05 were considered statistically significant.

Results

Sample description

The authors utilised data from 1372 students out of an estimated 20,000 active students at the university after excluding incomplete surveys (among which almost 1500 were pharmacy students). There were 159 pharmacy students (11.6%) and 1213 non-pharmacy students (88.4%). The mean age of the participants was 21.9 years. Most of them were females (66.6%), and 88.8% were living with their parents. As for the monthly income, 38.8% reported an income of 750000-1500000 LBP while only 11.3% had an income of more than 3000000 LBP (official Lebanese rate of 1 USD = 1,515 LBP). Most non-pharmacy students were in their first (25.5%) or second year (27.3%) of university education, whereas 64.7% of the pharmacy students were in their professional years (Table I).

Smoking status

Current smokers included exclusive waterpipe/cigarette users and users of both, while non-current smokers included never smokers and ex-smokers (used to smoke cigarettes/waterpipe, but now don't). Almost half of the participants (45.0%) were current smokers, 47.5% of the participants never smoked waterpipes nor cigarettes, and 7.5% were ex-smokers. (13.5% and 86.5% of non-current are ex-smokers and never-smokers, respectively) (Table II). Unfortunately, 76 out of 165 (46.1%) ex-waterpipe smokers still smoked cigarettes, and 33 out of the 78 (46.1%) ex-cigarette smokers consume waterpipes; therefore, those were not to be considered as ex-smokers.

The average age of current and non-current smokers was similar (22.0 and 21.8 years respectively). The majority of cigarette and waterpipe smokers reported daily smoking (66.9% and 45.9% respectively) and for a duration of three or more years (61.7% and 51.2% respectively).

Table I: Demographic characteristics of the participating faculty members

Demographic Characteristics		N (%)
Gender	Male	458 (33.4%)
	Female	914 (66.6)
Region	Beirut	371 (27%)
	Mount Lebanon	206 (15%)
	South	267 (19.5%)
	North	127 (9.3%)
	Bekaa	188 (13.7%)
	Akaar	64 (4.7%)
	Nabatieh	104 (7.6%)
	Baalbak/Hermel	45 (3.3%)
Residence	Alone	61 (4.4%)
	Dorms	23 (1.7%)
	With parents	1219 (88.8%)
	With spouse	69 (5%)
Marital status	Single	1255 (91.5%)
	Married	104 (7.6%)
	Divorced/separated	11 (0.8%)
	Widowed	2 (0.1%)
Employment	Unemployed	957 (69.8%)
	Part time	235 (17.1%)
	Full time	180 (13.1%)
Income (LBP)	<750000	309 (22.5%)
	750000-1500000	533 (38.8%)
	1500000-3000000	375 (27.3%)
	>3000000	155(11.3%)
Age	21.9 (mean age)	

Table II: Smoking status of respondents

Smoking Status		N (%)	Total (%)
Smoker	Cigarettes only	147 (10.7%)	618 (45%)
	Waterpipe only	310 (22.6%)	
	Cigarettes and waterpipe	161 (11.7%)	
Non-current smoker	Ex-Smoker	102 (7.5%)	754 (55%)
	Never Smoked	652 (47.5%)	

The most reported reason for using cigarettes was 'to relieve stress' (59.7% of cigarette smokers) followed by 'picked up the habit from friends and families' (41.2% of cigarette smokers). The most reasons reported by non-cigarette smokers for not smoking were lack of interest in smoking (76.1%) and awareness of the health hazards (63.1%). Nevertheless, some of those who were aware of the health hazards still engaged in waterpipe smoking (14.4% of non-cigarette smokers). When previous cigarette smokers were asked about their reasons for quitting smoking, 'preservation of health' was the most reported by them (79.5%) and very few tried nicotine replacement therapy (NRT) to achieve that (12.8%).

Concerning the number and frequency of cigarette smoking, daily smoking was reported in 76.8% of those who had been smoking for three or more years (38.9% smoked ≥ 15 cigarettes/day) and 55.2% for those who had been smoking for one to two years (13.4% smoked ≥ 15 cigarettes/day). Therefore, a longer duration of smoking is associated with more frequency of smoking and higher number of cigarettes smoked per day (Figures 1 and 2).

Risk factors for being a smoker (compared to non-smokers)

Multinomial logistic regression analysis was done to determine the risk factors that are significantly associated with smoking status (never smokers, ex-smokers, and current smokers). Variables in the bivariate analysis (data not shown) with a *p*-value of < 0.2 were entered into the multinomial logistic regression analysis. The authors tested for the following factors: gender, age, income, residence, school, alcohol/caffeine intake, and smoking status of family/friends.

Male gender was highly associated with smoking (aOR, 2.125; 95% C.I, (1.615-2.797); *p* < 0.001). Not being in pharmacy school (not having medical knowledge) was also found to be deterrent for the smoking status, where a lower percentage of smokers were pharmacy students (7.0%) compared to non-smokers (14.9%) (aOR, 2.399; 95% C.I, (1.538-3.742); *p* < 0.001). Moreover, those who drink alcohol on special occasions or once per month
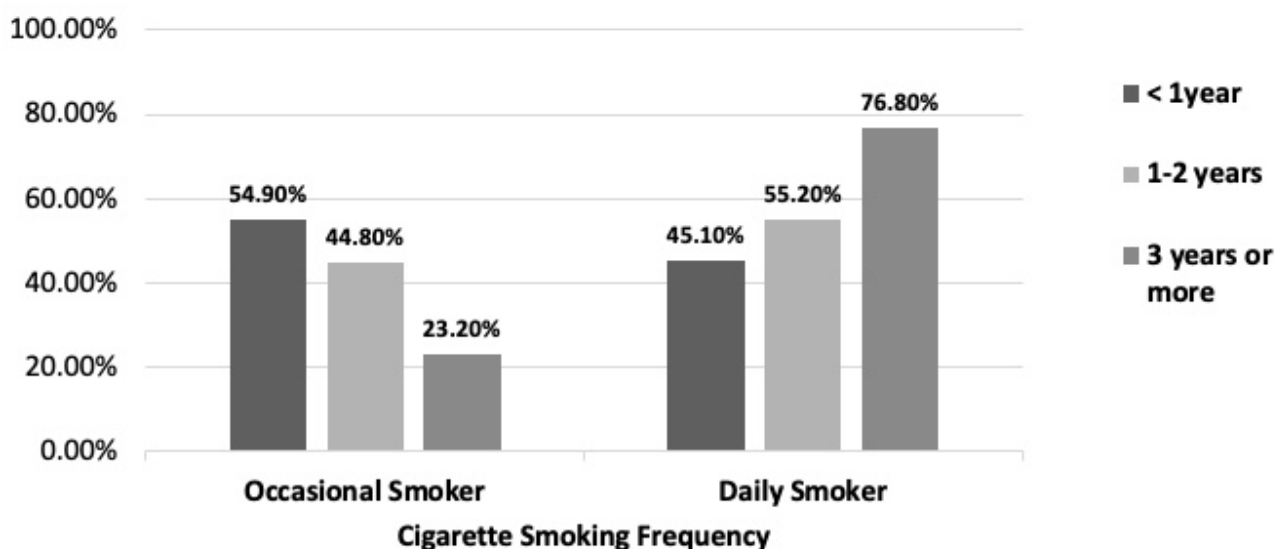

Figure 1: The effect of smoking duration on smoking frequency
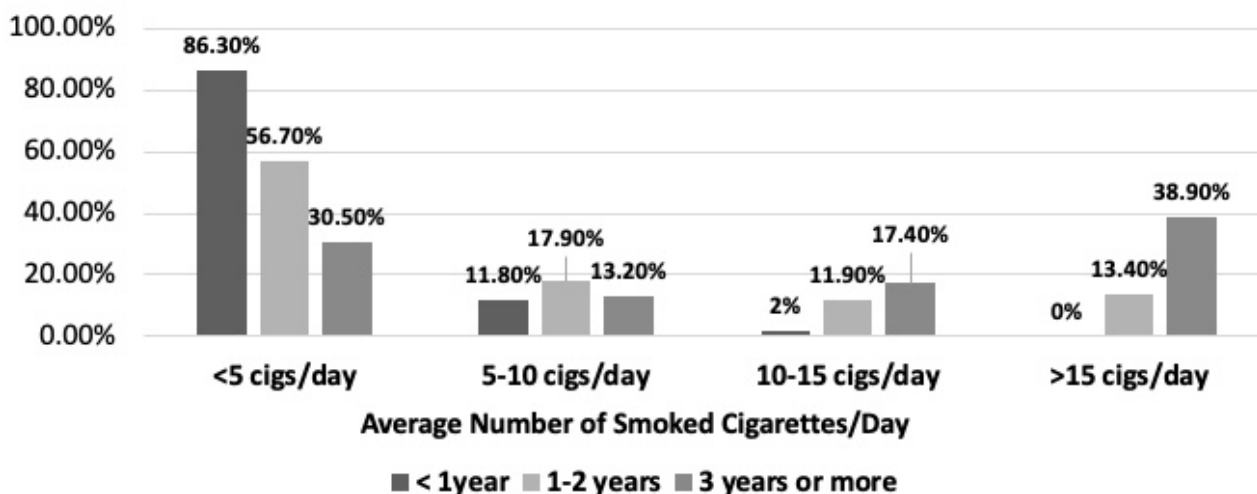

Figure 2: The effect of smoking duration on the average number of cigarettes smoked a day

tended to be smokers compared to non-drinkers (aOR, 4.146; 95% C.I, (2.271-7.566); *p* < 0.001 and aOR, 2.5999; 95% C.I, (1.810-3.731); *p* < 0.001 respectively). Similarly, caffeine consumers who drink at least two cups/day and even 1 cup/day were more likely to be smokers than those who do not (aOR, 2.940; 95% C.I, (2.1-4.116); *p* < 0.001 and aOR, 2.327; 95% C.I, (1.706-3.173); *p* < 0.001 respectively). As for the influence of family and peers on smoking status, students who had at least one of their direct household or friends who were smokers, were more likely to smoke than those who didn't have any (aOR, 2.131; 95% C.I, (1.380-3.742); *p* = 0.001 and aOR, 5.143; 95% C.I, (3.324-7.958); *p* < 0.0001 respectively) (Table III).

Risk factors for being an ex-smoker (compared to non-smokers)

Similar to the factors for being a current smoker, male gender (aOR, 1.843; 95% C.I, (1.152-2.950); *p* = 0.011), consumption of one cup of coffee/day (aOR, 1.810; 95% C.I, (1.069-3.065); *p* = 0.027), drinking alcohol on special occasions (aOR, 1.892; 95% C.I, (1.048-3.414); *p* = 0.034), and having at least one smoker among friends (aOR, 2.732; 95% C.I, (1.358-5.494); *p* = 0.005), were found to be significant risk factors for being an ex-smoker rather than a non-smoker.

In addition to those risk factors, heavy exercise and having an income greater than 3000000 LBP were linked to the

Table III: Bivariate and multivariate associations for risk factors of smoking (smokers versus nonsmokers)

Risk factors		Bivariate analyses		Multivariate Analyses	
		Smoker (n = 618) N (%)	Non-smoker (ref) (n = 652) N (%)	aOR (95% CI)	*p*-Value
Gender ***	Males	274 (44.3%)	146 (22.4%)	2.125 (1.615-2.797)	<0.0001
	Females (ref)	344 (55.7%)	506 (77.6%)		
Age (mean)		22.0399	21.5621		
School (pharmacy/non pharmacy)***	Pharmacy (ref)	43 (7%)	97 (14.9%)		
	Non pharmacy	575 (93%)	555 (85.1%)	2.399 (1.538-3.742)	<0.0001
Income* (LBP)	>3000000	74 (12%)	62 (9.5%)		
	1500000-3000000	148 (23.9%)	197 (30.2%)		
	750000-1500000	260 (42.1%)	237 (36.3%)		
	<750000 (Ref)	136 (22%)	156 (23.9%)		
Residence*	With parents (ref)	538 (87.1%)	596 (91.4%)		
	With spouse	29 (4.7%)	29 (4.4%)		
	Alone/dorms	51 (8.3%)	27 (4.1%)		
Alcohol intake***	Never (ref)	419 (67.8%)	572 (87.7%)		
	Special occasions	129 (20.9%)	64 (9.8%)	2.599 (1.81-3.731)	<0.0001
	At least 1 drink/month	70 (11.3%)	16 (2.5%)	4.146 (2.271-7.566)	<0.0001
Caffeine Intake***	Never/<1 cup/day (ref)	116 (18.8%)	247 (37.9%)		
	1 cup/day	263 (42.6%)	250 (38.3%)	2.327 (1.706-3.173)	<0.0001
	2 or more cups/day	239 (38.7%)	155 (23.8%)	2.94 (2.1-4.116)	<0.0001
Exercise*	Minimal (0-2 hr/week) (ref)	347 (56.1%)	400 (61.3%)		
	Moderate (3-7 hr/week)	162 (26.2%)	180 (27.6%)		
	Heavy (>1 hr/day)	109 (17.6%)	72 (11%)		
Family members who smoke***	None	44 (7.1%)	95 (14.6%)		
	Yes, but not in direct household	97 (15.7%)	160 (24.5%)		
	At least 1 sibling/parent/spouse	477 (77.2%)	397 (60.9%)	2.131 (1.380-3.290)	0.001
Friends who smoke***	None (ref)	29 (4.7%)	173 (26.5%)		
	At least 1 friend	589 (95.3%)	479 (73.5%)	5.143 (3.324-7.958)	<0.0001

For bivariate analysis:
p < 0.05*, 7 *p* < 0.01**, *p* < 0.001***
Ref: reference categorical variable for multivariate analysis; hr: hour

ex-smoking status compared to minimal exercise and having an income of less than 750000 LBP respectively (aOR, 1.885; 95%C.I, (1.042-3.409); *p* = 0.036 and aOR, 2.205; 95% C.I, (1.008-4.825); 7 *p* = 0.048, respectively) (Table IV).

Attitudes (smokers vs. non-smokers)

A significant correlation was found between smoking status and people who consider the smoke from waterpipe/cigarettes harmful (*p* = 0.001), where fewer smokers (82.2%) believed that the smoke from waterpipe/cigarettes was harmful compared to non-smokers (92.3%). Correlation between the knowledge on smoking health effects and smoking status was also found to be significant (*p* = 0.021) where more smokers (7.9%) answered that they know nothing about health effects of smoking than

non-smokers (4.6%). Likewise, a significantly higher percentage of smokers (15.9%) had the false idea that waterpipe smoking is less harmful than cigarettes than compared to nonsmokers (5.4%) (*p* < 0.0001). Moreover, more smokers compared to nonsmokers had the false ideas that an 'exclusive waterpipe user is not a smoker' (27.2% versus 13.3%, *p* < 0.0001) , and that 'it is safer to smoke for a year than quit' (34.1% vs. 10.1%, *p* < 0.0001) (Table V).

As for smoking among pharmacy students, nonsmoking pharmacy students were more likely to offer cessation advice than smoking students (76.7% versus 44.2%, *p* < 0.0001). Moreover, more of the non-smoking pharmacists (75.9%) believed that health professionals have an obligation to set a good example to patients including refraining from smoking themselves compared to smoking pharmacists (44.2%, *p* < 0.0001) (Table VI).

Table IV: Bivariate and multivariate associations for risk factors of being an ex-smoker (ex-smoker vs non-smokers)

Risk factors		Bivariate analyses		Multivariate Analyses	
		Ex-Smoker (n=102) N (%)	Never-Smoker (ref) (n=652) N (%)	aOR (95% CI)	*p*-value
Gender ***	Males	38 (37.3%)	146 (22.4%)	1.843 (1.152-2.950)	0.011
	Females (ref)	64 (62.7%)	506 (77.6%)		
Age (mean)***		23.2941	21.5621	1.062 (1.004-1.124)	0.037
School (pharmacy/non pharmacy)***	Pharmacy (ref)	19 (18.6%)	97 (14.9%)		
	Non pharmacy	83 (81.4%)	555 (85.1%)		
Income* (LBP)	>3000000	19 (18.6%)	62 (9.5%)	2.205 (1.008-4.825)	0.048
	1500000-3000000	30 (29.4%)	197 (30.2%)		
	750000-1500000	36 (35.3%)	237 (36.3%)		
	<750000 (Ref)	17 (16.7%)	156 (23.9%)		
Residence*	With spouse (ref)	11 (10.8%)	29 (4.4%)		
	With parents	85 (83.3%)	596 (91.4%)		
	Alone/dorms	6 (5.9%)	27 (4.1%)		
Alcohol intake***	Never (ref)	78 (76.5%)	572 (87.7%)		
	Special occasions	19 (18.6%)	64 (9.8%)	1.892 (1.048-3.414)	0.034
	1-4 drinks/month Daily	5 (4.9%)	16 (2.5%)		
Caffeine Intake***	Never/<1 cup/day	26 (25.5%)	247 (37.9%)		
	1 cup/day	48 (47.1%)	250 (38.3%)	1.810 (1.069-3.065)	0.027
	At least 2 cups/day	28 (27.5%)	155 (23.8%)		
Exercise*	Minimal (0-2 hr/week) (ref)	56 (54.9%)	400 (61.3%)		
	Moderate (3-7 hr/week)	26 (25.5%)	180 (27.6%)		
	Heavy (>1 hr/day)	20 (19.6%)	72 (11%)	1.885 (1.042-3.409)	0.036
Family members who smoke***	None	12 (11.8%)	95 (14.6%)		
	Yes, but not in direct household	20 (19.6%)	160 (24.5%)		
	At least 1 parent/sibling/spouse	70 (68.6%)	397 (60.9%)		
Friends who smoke***	None (ref)	10 (9.8%)	173 (26.5%)		
	At least 1 friend	92 (90.2%)	479 (73.5%)	2.732 (1.358-5.494)	0.005

For bivariate analysis:
p < 0.05*, 7 *p* < 0.01**, *p* < 0.001***
Ref: reference categorical variable for multivariate analysis; hr: hour

Table V: Differences in attitudes between smokers and non-smokers

Attitude		Smoking status		p-value, OR (95% CI)
		Smoker N (%)	Non-smoker N (%)	
Smoke from WP/ cigarettes harmful?	Yes	508 (82.2%)	696 (92.3%)	
	No	50 (8.1%)	31 (4.1%)	0.001
	I do not know	60 (9.7%)	27 (3.6%)	
Knowledge on smoking health effects	Solid	290 (46.9%)	390 (51.7%)	
	Brief	279 (45.1%)	329 (43.6%)	0.021
	None	49 (7.9%)	35 (4.6%)	
WP more or less harmful than cigarettes?	More	279 (45.1%)	428 (56.8%)	
	As harmful	211 (34.1%)	260 (34.5%)	<0.0001
	Less harmful	98 (15.9%)	41 (5.4%)	
	WP isn't harmful	30 (4.9%)	25 (3.3%)	
Consider someone who engages in WP smoking exclusively a smoker in general?	Yes	450 (72.8%)	654 (86.7%)	<0.0001, 2.442 (1.854-3.215)*
	No	168 (27.2%)	100 (13.3%)	
Is it safe to smoke for one year, then quit?	Yes	211 (34.1%)	76 (10.1%)	<0.0001, 4.625 (3.462-6.178)*
	No	407 (65.9%)	678 (89.9%)	
WP makes people feel more or less comfortable at parties	More comfortable	239 (38.7%)	256 (34%)	
	No difference	290 (46.9%)	395 (52.4%)	0.119
	Less comfortable	89 (14.4%)	103 (13.7%)	

*: 95% CI included for variables with just two categories
WP: water pipe

Table VI: Differences in attitudes/practices between smoking and non-smoking pharmacy students

Attitude/Practices		Smoking status		p-value, OR (95% CI)
		Smoker N (%)	Nonsmoker N (%)	
Offer cessation advise	Yes	19 (44.2%)	89 (76.7%)	<0.0001, 4.164 (1.986-8.727)*
	No	24 (55.8%)	27 (23.3%)	
How do you feel about counseling patients?	Feel comfortable	27 (62.8%)	78 (67.2)	0.0599, 1.216 (0.586-2.524)*
	Do not feel comfortable	16 (37.2)	38 (32.8%)	
	All the time	8 (18.6%)	24 (20.7%)	
Ask patients about their smoking habits	Yes, Only when its essential to diagnosis	23 (53.5%)	64 (55.2%)	0.666
	Yes, only when the patient is not offended	5 (11.6%)	17 (14.7%)	
	No, their smoking habits are personal affairs which I do not ask about	7 (16.3%)	11 (9.5%)	
Which statement do you agree with the most?	Health professionals have an obligation to set a good example to patients including refraining from smoking	19 (44.2%)	88 (75.9%)	
	Professionals have an obligation to set an example to patients but that only extends to working hours	4 (9.3%)	5 (4.3%)	<0.001
	I have no obligation to patients regarding my lifestyle choices; giving not relevant to my smoking status	20 (46.5%)	23 (19.8%)	

*: 95% CI included for variables with just two categories

Attitudes (Pharmacy versus non-pharmacy students)

In general, pharmacy students were more familiar with the harmful effects of tobacco compared to non-pharmacy students, where 70.4% of pharmacy students stated that they had solid knowledge concerning the detrimental effects of smoking versus only 46.8% of the non-pharmacy students. Moreover, more pharmacy students avoided cigarettes because they were aware of the negative effects compared to non-pharmacy students (81.4% versus 60.6%).

Discussion

In this cross-sectional survey, it was found that male gender, non-medical education, caffeine/alcohol consumption, and having smokers among family/friends were associated factors for being a smoker. Such factors were also recorded in several previous studies. Studies done in Bangladesh (Hossain *et al.*, 2017), Georgia (Chkhaidze *et al.*, 2013), and Egypt (Abu-elenin *et al.*, 2017) found that male gender was highly associated with being a smoker. The studies done in Bangladesh and Egypt also stated that smoking family members or peers influenced most smokers. Alcohol consumption was also found to be a risk factor for smoking according to a study done on Lebanese medical students (Chidiac *et al.*, 2016) and a Serbian study done on pharmacy students (Ilic *et al.*, 2020).

Smoking prevalence was high among LIU students where 45.0% of the surveyed students were current smokers (76.2% of the current smokers were waterpipe smokers). This considerable high prevalence of smokers among the students could be explained by the fact that the university has not set strict rules for banning smoking on campus. Smoking was banned in buildings, including classrooms, hallways, elevators, and balconies, but not in any of the campus's outdoor areas, including the entrances and gardens. As for the high percentage of waterpipe smokers among current smokers can be explained by the fact that this type of smoking is starting to be considered as a normal phenomenon in the society and there are several coffee shops that serve waterpipe 'Nargileh' in a close proximity to the campus. The high prevalence of smoking was accompanied by negative attitudes and false ideas regarding tobacco usage that were more common among smokers than non-smokers were.

Concerning schools, this study found that the school of pharmacy had the lowest percentage of smokers (27.0%) compared to other schools. Similar results were found in a Greek study where fewer smokers were reported among medical students (35.3%) compared to non-medical students (50.2%) (Alexopoulos *et al.*, 2010). In general, pharmacy students who are part of the medical team should be more aware about the dangerous diseases linked to smoking. This could explain the lower prevalence of smokers among pharmacy students in this study. The prevalence of smoking among pharmacy students in our study is similar to that seen in Lebanese (Chidiac *et al.*, 2016) and Argentinian medical students (Salgado *et al.*, 2017) (25.8% and 27.3%). However, such prevalence is higher than that reported in some countries such as Serbia (Ilic *et al.*, 2020) and Laos (Sychareun *et al.*, 2013) where the prevalence of smoking was found to be 17.3% and 1.5% among pharmacy students respectively.

The present study has shown that pharmacists who smoke do not tend to offer smoking cessation advice and take no responsibility in setting a good example for their patients. The study that was done on Lebanese medical students showed similar results where almost one-third of smoking medical students felt that they didn't have an obligation toward the society (Chidiac *et al.*, 2016). An Italian study among physicians also stated that a lower risk of smoking was reported among those who considered a healthcare professional as a model for the society (Ficarra *et al.*, 2011). Such results among medical professionals (including pharmacists) are alarming as they show that their smoking status has a negative impact on their role and responsibility in facing the tobacco epidemic in society. Besides, pharmacists should have a positive attitude while counseling since they are the ones whom the community first refers to when they need any medical advice.

Strengths and limitations

The study's strengths include its large sample size of 1372 students, as well as a comparison of pharmacy students (health-related education) to non-pharmacy students. This is the first study of its kind in Lebanon, as many earlier studies focused solely on medical or non-medical students and did not compare them. On the other hand, the study had several limitations. First, the study relied on subjective reporting rather than objective scoring to assess knowledge and attitudes. Second, rather than representing different universities, the students were all from LIU. Third, compared to non-pharmacy students, the number of pharmacy students included in this study was modest (159 versus 1213).

Conclusion

Almost half of the surveyed students were smokers, posing a hazardous risk to their wellbeing and to the health of those around them. The high smoking prevalence among LIU students should be addressed by allowing students to partake in more tobacco awareness campaigns, and by enforcing strict anti-smoking rules on campus grounds/cafeterias. Perhaps, increasing the apprehension of students regarding the dangerous effects of tobacco may limit the burden of such an increase in prevalence. In addition, it is of paramount importance to train pharmacy students during the early years of their education on the effective methods of smoking cessation and to inform them about their indispensable role in facing the tobacco epidemic. The school of pharmacy can

achieve such a goal by reinforcing their curriculum with thorough and well-developed anti-smoking guidelines and standards which best equip future pharmacists.

Since the results of this study also show that pharmacy students are more aware of the hazardous effects of tobacco than other students, other non-pharmacy schools can develop mandatory health related elective courses and anti-tobacco campaigns. By doing so, future generations can maintain a healthy lifestyle away from tobacco products and smoking.

Acknowledgements

Funding

Conflict of Interest

The authors declare no conflict of interest.

Authors' contributions

The authors confirm contribution to the paper as follows: study conception and design: J.S. and M.C.; acquisition of data: M.As. and N.O.; analysis and interpretation of results: Z.A., M.As., N.O., and J.S.; investigation: J.S., M.As., N.O., and M.C.; methodology: Z.A., M.As, N.O., M.Ak., and F.S.; project administration: J.S., M.C., and M.Ak.; resources: F.S. and M.D.; software: Z.A.; visualisation: M.Ak., M.C., and M.D.; writing original manuscript draft: M.As. and N.O.; revision and editing it critically for important intellectual content: F.S., M.D., M.Ak., and J.S.; validation: F.S. and M.D.; and supervision: J.S. All authors reviewed the results and approved the final version of the manuscript.

References

Abu-elenin, M.M., Omar Atalla, A.A., & El-Salamy, R. (2017). Cigarette smoking among medical students and some associated risk factors. *Tanta Medical Journal*, **45**(4), 206–212. https://doi.org/10.4103/tmj.tmj_3_17

Akl, E.A., Jawad, M., Lam, W.Y., Co, C.N., Obeid, R., & Irani, J. (2013). Motives, beliefs and attitudes towards waterpipe tobacco smoking: A systematic review. *Harm Reduction Journal*, **10**(1), 12. https://doi.org/10.1186/1477-7517-10-12

Alexopoulos, E. C., Jelastopulu, E., Aronis, K., & Dougenis, D. (2010). Cigarette smoking among university students in Greece: A comparison between medical and other students. *Environmental Health and Preventive Medicine*, **15**(2), 115–120. https://doi.org/10.1007/s12199-009-0110-0

Bonilha, A.G., de Souza, E.S.T., Sicchieri, M.P., Achcar, J.A., Crippa, J.A.S., & Baddini-Martinez, J. (2013). A Motivational Profile for Smoking Among Adolescents. *Journal of Addiction Medicine*, **7**(6), 439–446. https://doi.org/10.1097/01.ADM.0000434987.76599.c0

CDCTobaccoFree. (2018). *2014 SGR: The Health Consequences of Smoking—50 Years of Progress*. Centers for Disease Control and Prevention. https://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/index.htm

CDC (Centres for Disease Control and Prevention). (n.d.) *Youth and Tobacco Use | CDC* (online). Available from: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/index.htm

Chidiac, A., Tamim, H., Kanso, M., & Tfayli, A. (2016). Smoking among Lebanese medical students: Prevalence and attitudes. *Annals of Thoracic Medicine*, **11**(3), 183–190. https://doi.org/10.4103/1817-1737.185757

Chkhaidze, I., Maglakelidze, N., Maglakelidze, T., & Khaltaev, N. (2013). Prevalence of and factors influencing smoking among medical and non-medical students in Tbilisi, Georgia. *Jornal Brasileiro de Pneumologia : Publicação Oficial Da Sociedade Brasileira de Pneumologia e Tisilogia*, **39**(5), 579–584. https://doi.org/10.1590/S1806-37132013000500008

Ficarra, M.G., Gualano, M.R., Capizzi, S., Siliquini, R., Liguori, G., Manzoli, L., Briziarelli, L., Parlato, A., Cuccurullo, P., Bucci, R., Piat, S.C., Masanotti, G., de Waure, C., Ricciardi, W., & La Torre, G. (2011). Tobacco use prevalence, knowledge and attitudes among Italian hospital healthcare professionals. *European Journal of Public Health*, **21**(1), 29–34. https://doi.org/10.1093/eurpub/ckq017

Hajer Nouira, & Ahmed Ben Abedelaziz. (2018). *Smoking behavior among students of health sciences at the university of Monastir (Tunisia)*. **96**(010), 557–570

Hossain, S., Hossain, S., Ahmed, F., Islam, R., Sikder, T., & Rahman, A. (2017). Prevalence of Tobacco Smoking and Factors Associated with the Initiation of Smoking among University Students in Dhaka, Bangladesh. *Central Asian Journal of Global Health*, **6**(1), 244. https://doi.org/10.5195/cajgh.2017.244

Ilic, I., Grujicic Sipetic, S., Radovanovic, D., & Ilic, M. (2020). Cigarette Smoking and E-Cigarette Use by Pharmacy Students in Serbia. *Behavioral Medicine (Washington, D.C.)*, **46**(1), 43–51. https://doi.org/10.1080/08964289.2018.1541863

McBane, S.E., Corelli, R.L., Albano, C.B., Conry, J.M., Della Paolera, M.A., Kennedy, A.K., Jenkins, A.T., & Hudmon, K.S. (2013). The Role of Academic Pharmacy in Tobacco Cessation and Control. *American Journal of Pharmaceutical Education*, **77**(5), 93. https://doi.org/10.5688/ajpe77593

National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. (2012). *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General*. Centers for Disease Control and Prevention (US). Available from: http://www.ncbi.nlm.nih.gov/books/NBK99237/

Nemes-Nagy, E., Fazakas, Z., Preg, Z., László, M., Fogarasi, E., Germán-Salló, M., Bálint-Szentendrey, D., Ianosi, E. S., Ábrám, Z., Balázs, P., Kristie, F., & Pái, I.K. (2016). Smoking habits of pharmacy students attending the University of Medicine and Pharmacy in Targu Mures. *Pneumologia (Bucharest, Romania)*, **65**(2), 90–94

Salgado, M. V., Mejía, R.M., Kaplan, C.P., & Pérez-Stable, E.J. (2017). Smoking-Related Attitudes and Knowledge Among Medical Students and Recent Graduates in Argentina: A Cross-Sectional Study. *Journal of General Internal Medicine*, **32**(5), 549–555. https://doi.org/10.1007/s11606-016-3890-0

Salti, N., Chaaban, J., & Naamani, N. (2014). The economics of tobacco in Lebanon: An estimation of the social costs of tobacco consumption. *Substance Use & Misuse*, **49**(6), 735–742. https://doi.org/10.3109/10826084.2013.863937

Shen, X., Bachyrycz, A., Anderson, J.R., Tinker, D., & Raisch, D.W. (2014). Quitting Patterns and Predictors of Success Among Participants in a Tobacco Cessation Program Provided by Pharmacists in New Mexico. *Journal of Managed Care Pharmacy*, **20**(6), 579–587. https://doi.org/10.18553/jmcp.2014.20.6.579

Soubra, L., & Issa., M. (2018). Current practices of community pharmacists in counselling patients on smoking cessation in Beirut. *BAU Journal - Health and Wellbeing*, **1**(1). https://digitalcommons.bau.edu.lb/hwbjournal/vol1/iss1/7

Sychareun, V., Hansana, V., Choummanivong, M., Nathavong, S., Chaleunvong, K., & Durham, J. (2013). Cross-sectional survey: Smoking among medical, pharmacy, dental and nursing students, University of Health Sciences, Lao PDR. *BMJ Open*, **3**(8). https://doi.org/10.1136/bmjopen-2013-003042

Tran, M. T., Holdford, D. A., Kennedy, D. T., & Small, R. E. (2002). Modeling the Cost-Effectiveness of a Smoking-Cessation Program in a Community Pharmacy Practice. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*, *22*(12), 1623–1631. https://doi.org/10.1592/phco.22.17.1623.34118

Villanti, A., Boulay, M., & Juon, H.-S. (2011). Peer, parent and media influences on adolescent smoking by developmental stage. *Addictive Behaviors*, *36*(1–2), 133–136. https://doi.org/10.1016/j.addbeh.2010.08.018

WHO (World Health Organisation) (n.d.a) *Tobacco* (online). Available from: https://www.who.int/news-room/fact-sheets/detail/tobacco

WHO (World Health Organisation) (n.d.b). *Monitor tobacco use and prevention policies (Tobacco control)* (online). Available from: https://www.who.int/data/gho/data/themes/topics/topic-details/GHO/gho-tobacco-control-monitor