Original Article

Electronic Cigarettes Use Among Medical Students: Prevalence, Social Determinants and Purpose of Use

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Abstract

Background: Electronic cigarettes (e-cigarettes) are new form of nicotine products that has become a worldwide trend. Not enough data about its prevalence, determinants and reason for use among medical college students are available. Our aim in this study was to estimate the prevalence, social correlates and purpose of use of e-cigarettes among medical students in Riyadh, Saudi Arabia.

Methods: A well-structured paper and electronic questionnaire distributed among 900 students of two government and one private medical college.

Results: A total of 636 out of 900 targeted students (71%) answered the questionnaire (female represent 33.3%). The prevalence of tobacco and e-cigarettes use among the participants was 20.7% and 3.3%, respectively, while 5.7% reported a previous trial of e-cigarette. E-cigarette smoking is more prevalent among males than female and is associated with more travel abroad. Most of the e-cigarette's smokers (88.1%) used it with other tobacco products and showed positive correlation with other tobacco products especially the water pipe and conventional cigarettes. Only 36% of e-cigarette smokers used them on a daily basis. Among e-cigarette users, 43% used it for fun and exploration, 26.4% to quit conventional smoking, 13.9% to minimize harm from other products, and 9% used it in places in which other types of smoking were prohibited.

Conclusion: The prevalence of e-cigarettes among college students is like national and Western World com-

الملخص

خلفية: السجائر الالكتروني عبارة عن شكل جديد من أشكال التبغ الذي أصبح استخدامه شائعا حول العالم. لا توجد هنالك معلومات كافية حول معدل الانتشار المحددات وأسباب استخدام السجائر الالكتروني لدى طلاب الكليات الطبية. تهدف هذه الدراسة الى تحديد معدل الانتشار وأسباب استخدام السجائر الالكتروني لدى طلاب الكليات الطبية بمدينة الرياض بالمملكة العربية السعودية.

طريقة البحث: تم استخدام استبيان محكم في شكل ورقي والكتروني على تسعمائة طالب من اثنين من الكليات الحكومية وواحدة من الكليات الخاصة.

النتائج: أجاب ٦٣٦ طالب من أصل ٩٠٠ على الاستبيان (٧١٪) منهم ٣٣,٣٪ من الاناث. يمثل معدل استخدام التبغ والسجائر الالكتروني ٢٠,٧٪ و٣,٣٪ على التوالي بينما افاد ٥,٧٪ من الطلاب استخدامهم السجائر الالكتروني من قبل. يستخدم الذكور السجائر الالكتروني بمعدل أعلى من الاناث ويرتبط ذلك بحالات السفر خارج البلاد. يستخدم معظم مستخدمي السجائر الالكتروني (٨٨,٨٪) التبغ مع أنواع أخرى منه خاصة الشيشة والسجائر العادي. يستخدم ٣٦٪ فقط من الطلاب السجائر الالكتروني يوميا. من ضمن المستخدمين، يدخن ٤٣٪ منهم لأغراض التسلية و٢٦,٤٪ ليساعدهم على الاقلاع عن التدخين العادي و١٣,٩٪ ليقلل من اضرار التبغ و٩٪ يستخدمونه في الأماكن التي لا يسمح فيها استخدام أنواع التبغ الأخرى.

الخلاصة: معدل انتشار السجائر الالكتروني لدى طلاب الكليات الطبية بمدينة الرياض بالمملكة العربية السعودية يماثل المعدل

munity figures. Raising awareness of its potential harm and medical consequences through curricular and extracurricular activities is of paramount importance for students' and their future patients' health.
Key work: e-cigarettes, medical students, medical college, Saudi Arabia

القومي والمعدل بالدول الغربية. رفع الوعي عن مخاطر استخدام السجائر الالكتروني واثاره الصحية عن طريق المناهج والأنشطة خارج المناهج له أهمية قصوى للطلاب والمرضى.

Introduction

Electronic cigarettes (e-cigarettes) are battery-operated products designed to deliver nicotine and other chemicals. An internal heat source turns nicotine and other chemicals into a vapor that is inhaled by the user [1]. Despite limited data about short- and long-term health effects of e-cigarette exists, their popularity has been increasing [2, 3]. Currently, there are more than 500 brands of e-cigarette available, and they continue to be extensively promoted, primarily via the internet, shopping mall kiosks, and viral marketing. So, it is likely that consumer awareness and e-cigarette use will continue to increase. Results from different surveys conducted globally across different age groups indicate that the prevalence of e-cigarette is increasing and will continue to rise for many reasons, including their promotion, lack of selling and distribution regulation, controversies about their side effects, short-, mid-, and long- term complications, and lack of willingness to quit smoking among the current users [4]. Selling and marketing of e-cigarettes are prohibited in Saudi Arabia in accordance with the decision made by health ministers of the Gulf Region [5]. The Centers for Disease Control and Prevention has indicated that awareness of e-cigarette has doubled from 16.4% in 2009 to 32.2% in 2010, and the number of people reporting using e-cigarette (even just trying them) has more than quadrupled between 2009 and 2010 [6].

The use of e-cigarette is more prevalent among youth and adolescent. It has increased tremendously as a substitute for cigarettes or other form of smoking as represented by figures from United States (US), United Kingdom (UK), Poland, and Canada [7-10]. E-cigarette use is strongly correlated with traditional smoking [9]. In Saudi Arabia and the Gulf Cooperation Council [GCC] region, the prevalence of e-cigarette has not been well studied. Only three studies have examined this issue in Saudi Arabia; one of those studies examined e-cigarette smoking among university students [11-14].

This study was conducted to measure the knowledge, prevalence, purpose for using e-cigarette, and their determinants among medical students in Riyadh.

Methods

Sampling and Participants: This is a cross sectional study in which a paper-based questionnaire was distributed to students in one government medical school, (Imam Mohammad Ibn Saud Islamic University (IMSIU) and one private medical school (Almarefah college) in Riyadh, while an electronic questionnaire distributed to a third government

medical school (Princess Nourah bint Abdulrahman University) due to feasibility matters. Nine-hundred male and female, senior and junior students were targeted by the questionnaire in April 2017. A pre tested questionnaire distributed to students who were available during break time between lectures, and targeted emails were sent to students' batches through their leaders. In each medical school, at least one senior trained student coordinated and supervised the distribution and gathering of questionnaires among his colleagues during breaks.

Two public health and research experts assessed its face validity and approved it after minor amendments. After that, questionnaire distributed to a pilot sample of twenty students. We asked their opinions about any ambiguity, difficulties, editing, and/or layout corrections. Their responses were re-evaluated by the team in order to insure the quality of gathered data. Further minor modifications were made on the form and to the order of some of the questions accordingly.

Written consent was obtained from all participants. Their participation was voluntary, and no incentives were given or promised. These issues were emphasized by the data collector and written clearly in the questionnaire as a brief introduction. Anonymity of all respondents was insured by writing it clearly and by avoiding direct questions in the questionnaire that may disclose any person's identity. The study received the institutional review board approval from Imam Mohammad ibn Saud Islamic University, # 024-2017.

Data Analysis:

We used the Statistical Package for Social Sciences (SPSS) version 22.0 to analyze our data [15]. Descriptive analysis was used to present means, standard deviations, frequency, and percentages. We used non-parametric tests, including the Mann-Whitney and Kruskal-Wallis to test for differences, and Spearman's correlation was used to assess the relationship between different variables. A p values <0.05 was set as a significant statistical difference.

Results

A total of 636 out of 900 targeted students in two government medical schools and one private medical school responded to our questionnaire. The response rate was 71%. Female respondents represent one third (33.3%) of the sample, and almost all participants' (94.5%) were <26 years old. Most of the participants had traveled abroad >4 (63.5%), while <16% reported no previous travel to other countries. Almost all of the participants (98.7%) admitted excellent or good financial status (see Table 1).

The prevalence of current nicotine use among the participants was 20.7 % (29% among males and 4.2% for females), and 12.3% were ex-smokers. Water-pipe smoking was the most common type ever used (53.8%) followed by conventional cigarettes (52.2%), while e-cigarette and chewing tobacco were used by 9% and 4.7% respectively.

When asked about first-used products, conventional cigarettes were the most first-tried (55.6%) followed by water-pipe (41.2%) and then chewable tobacco (2%) while 1% (two participants) reported using e-cigarette as their first used nicotine derivatives. One of them progressed to use other tobacco products, and the other one kept using only e-cigarette.

Among total participants in the study, 3.3%(1.2% 4.2% for males and female, respectively) admit current e-cigarettes use while 5.7% reported a previous trial of e-cigarette. Most of our participants (87.7%) did not know anyone or only ≤4 e-cigarette users in comparison to 3.1%, who knew ≥10 e-cigarettes users. A considerable percentage (9.1%) stated that they knew 5–10 e-cigarettes users.

Most of the e-cigarette's smokers (88.1%) used it in combination with other tobacco products. Three fourths (75.4%) of them concurrently used a water pipe, 59.6% smoked conventional cigarettes, and 5.3% used chewing tobacco. Pearson's correlation test showed an association between e-cigarettes smoking and use of other nicotine types in general (r=0.322). Furthermore, this association was mild to moderate for water pipe (r=0.367) and conventional cigarettes (r=0.332). In contrast, the association was weak for chewing tobacco (r=0.149).

Thirty six percent of e-cigarettes smokers used it on daily basis, while 34% and 30% used it on weekly and monthly basis, respectively. Answers on the purpose of e-cigarettes usage are presented in Table 2.

The use of the e-cigarettes is significantly predominant among males over females (p = 0.036), and among those who traveled abroad (p = 0.001). Regarding e-cigarettes knowledge, many students admit knowing about the e-cigarettes to some extent (62%), and 16.8% had extensive e-cigarettes knowledge; however, one fifth of the students (21%) did not know anything about it. e-cigarettes smokers attributed their first exposure to e-cigarettes through friends (67%), internet (23%), and (10%) family members (10%).

Table (1) Demographic correlates of responding students (n=636)

Variables		Smoking Electronic			Total
		current E. Cig user	p. value	Non-E. cig. users	
Gender	Male	18 (4.2%)	0.036	406 (95.8)	424 (100%)
	Female	3 (1.4%)		209 (88.6%)	212 (100%)

Age	21-18	11(44.9%)	0.608	234(45.1%)	245(100%)
	25-22	8 (22.5%)		348(77.5%)	356(100%)
	≥26	2 (5.7%)		33(94.3%)	35(100%)
Type of college	Government	16(3.0%)	0.051	513(97.0%)	529(83.2%)
	Private	5(4.7%)		102(95.3%)	107(16.8%)
Travel abroad	≥4	18(4.5%)	0.001	386(95.5%)	404(63.5%)
	≤3	2(1.5%)		131(98.5%)	133(20.9%)
	0	1(1.0%)		98(99.0%)	99(15.6%)
Financial status	Excellent	13(3.6%)	0.654	353(96.4%)	366(57.5%)
	Good	8(3.1%)		254(96.9%)	262(100%)
	Poor	0(0%)		8(100%)	8(100%)

Table (2) Purpose of using e-cigarettes

Purpose of use	Percentage
Due to medical advice	2.8% (n=1)
To help me quit other tobacco products	26.4% (n=5)
Reduce harm caused by other tobacco products	13.9% (n=3)
An opportunity to smoke in places that prevent cigarette and water-pipe smoking	8.3% (n=2)
Peer pressure	5.6% (n=1)
Fun and exploration	43% (n=9)

Discussion

Our study is one of few studies that studied e-cigarette smoking in Saudi Arabia, and it is the first study to explore e-cigarette smoking phenomenon among medical students. Albaik and colleagues reported in study of an online public questionnaire that 33.5% of their sample (3000 respondents) admitted a previous trial of e-cigarette, and current users were estimated to be 2.5% [13]. Another study explored e-cigarette smoking among three health-science colleges, and one engineering college found that 25% of respondents admitted previous use of e-cigarette [12]. In the US, 12.6% admitted previous use, and 3.7% of the sample population were reported as current users [7]. Furthermore, 16.1% and 5.7% of youth and young Canadians reported previous and current use of EC, respectively while in the UK, 6.7% are current users and one-third admitted previous use [8]. The percent-

age of current e-cigarette users in our study (3.3%) was within the range of national and international figures (2.5%–6.7%) while the percentage of previous use was below registered ones in national and international studies. This discrepancy requires further study. Only 36% of e-cigarette users use e-cigarette on a daily basis in comparison to the US population, who use it daily or several days per week [7]. As in Albaik and colleagues' study, and similar to conventional tobacco smoking, e-cigarette smoking is more prevalent among males than females, which may be interpreted at least partly by the cultural values and stigmas related to female smoking. However, this phenomenon was not limited to the Saudi population [16, 17]. Although only 1% (two students) of e-cigarette users admitted using e-cigarette as their first nicotine product; however, the gate theory for progression to use other tobacco products when start e-cigarette smoking cannot be ruled in or out as the sample number was small and the history of e-cigarette smoking in Saudi population is too recent to be available to most of these students during their adolescence smoking exploratory period. Almost all e-cigarette users (99%) are current or previous conventional tobacco users, and 88% of them use e-cigarette concurrently with other tobacco products, which was found also in other national [12, 13] and to lesser extent in other international studies [7-9]. E-cigarette smoking has been associated with water-pipe usage, which may reflect the nature of exploring and intermittent usage pattern of these two products.

As in other national and international studies, most of students admit at least some e-cigarette awareness; however, 21% of them admit no previous e-cigarette knowledge, which may need to be further reconsidered in the medical school curriculum as these students represent future doctors. In a Saudi study, >66% of e-cigarette smokers had an e-cigarette user friend and admitted the friend's role for their e-cigarette trial [12]. From another point-of-view, we found that friends were the major e-cigarette knowledge more than internet and family, which emphasizes the effects of peers on an individual's behavior and attitude. Smoking e-cigarette was more common among those who travelled abroad regardless of their economic status, which may reflect cultural correlation or travelling to countries with different e-cigarette related attitudes and legal considerations or the exploratory and curiosity nature of these students.

Help with quitting conventional tobacco use is a claim advertised by manufacturing companies [4], however, it is clear from our findings and other two national studies that most of e-cigarette usage in Saudi Arabia is not performed with the aim of quitting conventional smoking as only less than one third of respondents reported that goal [12,13]. This could help when writing health and public policies related to e-cigarette. Although e-cigarette importing, selling, and adverting is not allowed in Saudi Arabia, no strict monitoring is applied, and internet advertisement is widely available.

Conclusion

The picture of smoking e-cigarette among medical school is similar to that seen in other colleges, Saudi community, and to some extent to the Western World youth population. However, most e-cigarette usage is not related to the purpose of quitting; this finding is still debatable. Raising awareness of e-cigarette's harmful medical consequences should be emphasized through campaigns and by updating and enriching medical college's curriculum to involve these new trends of nicotine smoking in order for these future doctors to be good health advocates for their patients' health.

Disclosure

Author has no conflict of interests, and the work was not supported or funded by any drug company.

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