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Original Article

Knowledge, attitude and perceived harm of e-cigarette use behaviour among medical and dental undergraduate students in UiTM

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ABSTRACT

Background: Healthcare professionals have a prominent role to play in addressing the tobacco epidemic and the rapid increase of e-cigarette use in the population. The growing interest of electronic cigarettes has led to a broad debate whether e-cigarettes can be used as a harm reduction tool towards smoking. **Objectives:** This study aims to explore the knowledge, attitude, and perceived harm of vaping behaviour among medical and dental undergraduate students in UiTM. **Methods:** A questionnaire-based survey was administered using Google Form to all participants. Demographics and data from four domains of knowledge, attitude towards vaping behaviour, mass media exposure of e-cigarettes and perception of health-related risks of vaping were collected. **Results:** Data were obtained from 309 undergraduates with a mean age of 20.6 ($SD \pm 1.60$). The majority of them have never smoked (96.1%) or used e-cigarettes (99.0%). Nine in 10 believe they play a role in their patient's smoking cessation therapy in the future (91.3%). Slightly more than half (62.1%) have poor knowledge of e-cigarette, less favourable attitude towards vaping (50.8%) and perceived e-cigarettes to be less harmful (56.0%). The majority of them also claimed high exposure towards e-cigarette marketing from the mass media (85.1%). **Conclusion:** UiTM medical and dental undergraduates have less favourable attitudes towards e-cigarettes but lacked knowledge on the issue. They also perceived the e-cigarettes to be less harmful to health compared to conventional cigarettes. This points out the urgent need to further educate health professionals and also to provide clear guidelines at every level to regulate vaping behaviour among the population.

Keywords: e-cigarettes, e-cigarette use, knowledge, attitude, perceived harm

INTRODUCTION

Electronic cigarette (e-cigarette) is an electronic device that contains a cartridge filled with liquid nicotine and/or other chemicals that produces inhalable smoke, also known as vape (Abdulrahman et al., 2020). Nicotine, the primary addictive component in cigarettes, is present at varying levels in many e-liquids. Nicotine delivery in e-cigarettes to the user can reach or exceed levels from combustible cigarette smoking. Non-users may experience second or third-hand exposure to nicotine from e-cigarettes. Apart from the concentration of nicotine in the e-liquid, there are other elements and features of e-liquids or e-cigarettes that can influence nicotine intake on their own, by altering the actions of e-cigarette use patterns in general, making nicotine more palatable, or improving the delivery or bioavailability of nicotine (DeVito & Krishnan-Sarin, 2018).

E-cigarettes or vape usage has been increasing among adolescents in recent years. The increased prevalence of vaping may be due to the widely accepted perception that it can be used for nicotine cessation therapy among tobacco users (Hammond et al., 2019). It is also worrying that adolescents would initiate the vaping behaviour although they are not tobacco users, just to keep up with the trend of vaping and may ultimately lead to tobacco use. In the U.S, the use of E-cigarettes increased 78% among high school students and 48% among middle school students from 2017 to 2018. However, since the introduction of e-cigarettes, the usage of traditional tobacco methods are also increasing, and it is estimated that one in five high school students may now be using tobacco products (Caraballo et al., 2017).

The prevalence of E-cigarettes use increased in Malaysia from 0.8% in 2011 to 4.9% in 2019. Three quarters of Malaysian E-cigarette users also smoke combustible cigarettes, and the prevalence of E-cigarette use among Malaysian smokers in 2014 was consistent with the prevalence of use among smokers from Canada and the US in 2016 (Driezen et al. 2022). In a research conducted in the Selangor and Kuala Lumpur areas of Malaysia, Wong et al. recorded 39.9% of e-cigarette usage among young students of higher institutions and 36% among young professionals (Wong et al. 2016). E-cigarettes were more likely to be used by university students who were male, cigarette smokers and whose peers used e-cigarettes. Furthermore, young adults are more likely to be aware of and use e-cigarettes if current trends in e-cigarette advertising continue (Duan et al. 2020).

In May 2016, the FDA finalized a rule extending its authority to all tobacco products, including e-cigarettes, cigars, hookah tobacco and pipe tobacco. This is to prevent deceiving information and claims by tobacco product manufacturers. Another important part of this rule is to ensure that all importers and retailers of newly-regulated tobacco products are following the same rule (Froum & Neymark, 2019). In Malaysia, this industry is unregulated, the current government policy on nicotine regulation is being developed to include e-cigarettes. There are no guidelines in the liquids used in e-cigarettes as well as the aerosols they contain for regulating the rate of dosing, pollutants, toxins and carcinogens. Since e-cigarettes are neither cigarettes nor smokeless tobacco, they avoided the marketing prohibitions for the former tobacco products that have been in place for decades (Ghazali et al. 2018).

Health effects of vaping include irritation of the upper respiratory tract and may affect the central nervous system (Blood, 2018). The exposure to propylene glycol causes eye irritation and affect one's spleen and his or her behaviour too (Kanodia, 2016). However, vaping causes less serious side effects namely, nausea, vomiting, mouth and throat inflammation, and coughing (Damle, 2015). In developing cancer risks from the emitted vapour, the vaping behaviour, e-juice contents, and device settings determine how great the risks can be to the user (Stephens, 2017). Vaping also give harmful effects to bystanders whereby they may get irritated eyes and upper respiratory tract, and experience nicotine effects like escalated heart rate and high systolic blood pressure (Visser et al., 2019). Recently, an outbreak of e-cigarette, or vaping, product use-associated lung injury (EVALI) in the U.S Centre of Disease Control to recommend avoiding the use of tetrahydrocannabinol (THC) while further investigations continue. This was so because most EVALI patients used THC-containing e-cigarettes (Lewis et al., 2019; Navon et al., 2019).

In Malaysia (2011-2013), the awareness of e-cigarettes was 21.0%. It was found that mostly the young, males, more educated and wealthy groups know the existence of e-cigarettes (Palipudi et al., 2016). The vaping device widely used in Malaysia is the third-generation electronic cigarettes that are known as mods or advanced personal

vaporisers (Mohamed et al., 2018). A social influence of the increasing prevalence of vaping is the increase in the number of teenagers to start or continue conventional cigarette smoking (Chao et al., 2019).

This research aims to assess the knowledge, attitude, perceived harm of e-cigarette use and mass media exposure of vaping products among the medical and dental undergraduate students in UiTM. The null hypothesis of this study is there is no significant difference between the knowledge, attitude, perceived harm of vaping behaviour and mass media exposure of vaping products between medical and dental undergraduate students in UiTM.

MATERIALS AND METHODS

The study was granted ethics approval from the Research Ethics Committee, UiTM (Ref. No. REC/02/2020 (UG/MR/68)). This cross-sectional study is to determine the knowledge, attitude and perception of e-cigarette use and its health-related risks among undergraduate students in the Faculty of Medicine and Dentistry in UiTM. We have assured all participants that taking part in our project was voluntary, confidential and kept anonymous.

A Google Form was prepared based on a validated questionnaire from the study done by Minhat et al., (2017) and was distributed to the participants via text message. The questionnaire was divided into six parts; Section A (Socio-demographic), Section B (Smoking status), Section C (Knowledge), Section D (Mass media exposure on vaping products), Section E (Attitude towards vaping behaviour), and Section F (Perception towards health-related risks of e-cigarette use).

The *knowledge* section of the questionnaire consists of 10 questions requiring participants to answer either “True”, “False”, or “Don’t know” for each question. Meanwhile, in the *mass media exposure* section, seven questions were asked with a “Yes” or “No” choice of answer. For the *attitude* and *perception* sections, the answers required were Likert-based response options (1 = strongly disagree; 2 = disagree; 3 = neutral/unsure; 4 = agree; 5 = strongly agree). In addition to that, we also further categorized the variables dichotomously for each domain. The cut-off points used for the dichotomous variables were the medians of the overall score for each domain except for the mass media exposure on vaping products which we took the lowest cut-off point was less than 1; as shown below:

Table 1. The questionnaire cut-off points for scoring of all domains

Domain	Cut-off points for scoring
Knowledge level on vaping behaviour	Poor (>8) Good (≤8)
Attitude towards vaping behaviour	Favourable (>35) Less Favourable (≤35)
Perceived harm of vaping	Harmful (>14) Less harmful (≤14)
Mass media exposure on vaping products	High exposure (>1) Less exposure (<1)

A purposive sampling method was applied for this study as this study was conducted during the COVID-19 outbreak. The inclusion criteria were medical and dental undergraduate students in UiTM Sungai Buloh from Year 1 to Year 5. We calculated the minimal sample size needed for this study is 200 participants based on the total number of 1400 undergraduate students in UiTM Sungai Buloh. A total of 312 participants have answered the online questionnaire from July to August 2020, however, only 309 participants were included in the study due to the missing responses during data entering and cleaning.

The data were imported from the Microsoft Excel Sheet from the Google Form into the IBM SPSS Version 25.0 Software for data analysis. Descriptive analysis was done for frequencies and percentages for each domain of the questionnaire's responses. Chi-square and Fischer Exact tests were used to test associations between variables with the statistical significance set at $p < 0.05$.

RESULTS

Table 2 shows the sociodemographic distribution of participants by faculty. This includes age, year of study, smoking and vaping status, whether they have been taught on smoking cessation and their role in being a part of smoking cessation in the future. Participants were in the age range of 18 to 25 years old. Age, academic year, clinical or preclinical students were observed to be statistically significant between the medical and dental students ($p < 0.05$). Higher percentages of dental students (54.5%) informed that they were being taught smoking cessation in their curriculum as compared to the medical students (21.5%). This observation was found to be statistically significant ($p = 0.000$). Similarly, with regards to whether or not they perceived that they will play a role in smoking cessation in their professional future, the dental students scored a higher percentage of the positive response with 94.5% compared to 87.5% among their medical counterparts ($p = 0.02$).

Table 3 provides the distribution of the responses toward the four domains of the self-administered questionnaire according to the group. For the domain of the level of knowledge on vaping, the majority of all participants (62.1%) have a poor level of knowledge. Collectively, the participants have almost had an equivocal stand regarding their attitude towards vaping behaviour, whereby 49.2% of them have favourable opinions towards vaping. The observation towards vaping was consistent in the next domain, whereby the majority of them (56.0%) were perceived to be less harmful in comparison with the conventional combustible cigarette. With regards to the mass media exposure regarding vaping products, almost 9 in 10 of the total participants claimed that their exposure was minimal. However, the findings from all of the four domains in the questionnaire were not found to be statistically significant ($p > 0.05$).

Table 4 shows that those with good level of knowledge had negative attitude towards vaping behaviour (39.4%). The finding however was not statistically significant ($p = 0.08$). Statistically, a significant difference was observed as depicted in Table 5, whereby the majority of the participants who have a positive attitude towards vaping also perceived that vaping is less harmful than cigarette smoking (32.0%) ($p = 0.03$).

Table 2. Sociodemographic characteristics, smoking status, vaping status and media exposure on vaping products among medical and dental undergraduates

Characteristic	Medical Students N=144, n (%)	Dental Students N=165, n (%)	p-value
Age (years) Mean (SD) = 20.6(1.60)			
18	4 (2.7)	0 (0.0)	0.000 ^b
19	69 (47.9)	45 (27.3)	
20	27 (18.7)	13 (7.9)	
21	13 (9.0)	28 (17)	
22	26 (18.0)	46 (27.9)	
23	4 (12.7)	21 (12.7)	
24	0 (0.0)	11 (6.7)	
25	1 (0.6)	1 (0.6)	
Academic Year			
Year 1	76 (52.7)	50 (30.3)	0.000 ^a
Year 2	27 (18.8)	13 (7.9)	
Year 3	10 (6.9)	35 (21.2)	
Year 4	26 (18.1)	48 (29.1)	
Year 5	5 (3.5)	19 (11.5)	
Clinical/Preclinical Year			
Preclinical	103(71.5)	63 (38.2)	0.000 ^a
Clinical	41 (28.5)	102 (61.8)	
Smoking status			
Former Smoker	2 (1.4)	3 (1.8)	0.10 ^b
Current Smoker	6 (4.2)	1 (0.6)	
Never Smoked	136 (94.4)	161 (97.6)	
Vaping Status			
Vape user	5 (3.5)	1 (0.6)	0.14 ^b
Dual user	2 (1.4)	1 (0.6)	
None	137 (95.1)	163 (98.8)	
'Were you taught on smoking cessation?'			
Yes	31 (21.6)	90 (54.5)	0.000 ^a
No	113 (78.5)	75 (45.5)	
'Do you think you play a role in smoking cessation in your future career?'			
Yes	126 (87.5)	156 (94.5)	0.02 ^b
No	0 (0.0)	1 (0.6)	
Maybe	18 (12.5)	8 (4.8)	
Media Exposure on Vaping Products			
Yes	121 (84.0)	142 (86.1)	0.62 ^a
No	23 (16.0)	23 (13.1)	

^aChi square test, ^b Fisher's Exact Test were applied.

Table 3. Distribution of the level of knowledge on vaping, attitude towards vaping behaviour, perceived harm of vaping and mass media exposure among medical and dental undergraduates.

Domain	Medical Students N= 144 n (%)	Dental Students N= 165 n (%)	Total N= 309 n (%)	p-value
Knowledge level on vaping				
Poor	92 (63.9)	100 (60.6)	192 (62.1)	0.55
Good	52 (36.1)	65 (39.4)	117 (37.9)	
Attitude towards vaping				
Favourable	70 (48.6)	82 (49.7)	152 (49.2)	0.85
Less Favourable	74 (51.4)	83 (50.3)	157 (50.8)	
Perceived harm of vaping				
Harmful	63 (43.8)	73 (44.2)	136 (44)	0.93
Less harmful	81 (56.3)	92 (55.8)	173(56)	
Mass media exposure on vaping products				
High exposure	23 (16)	23 (13.9)	46 (14.9)	0.62
Less exposure	121 (84)	142 (86.1)	263 (85.1)	

Chi-square tests were applied.

Table 4. Association of participants' level of knowledge on vaping behaviour with attitude towards vaping behaviour (N=309)

	Positive attitude towards vaping behaviour n(%)	Negative attitude towards vaping behaviour n(%)	p-value
Level of knowledge on vaping			
Poor	87(28.2)	105 (34.0)	0.08
Good	65 (21.0)	53 (39.4)	

Chi-square tests were applied

Table 5. Association of participants' 1) level of knowledge and 2) attitude towards vaping behaviour with the perception of harm in vaping behaviour (N=309)

	The perception that vaping is harmful than cigarette n(%)	The perception that vaping is less harmful than cigarette n(%)	p-value
Level of knowledge on vaping			
Poor	91 (29.4)	101 (32.7)	0.12
Good	45 (14.6)	72 (23.3)	
Attitude towards vape behaviour			
Favourable/positive	53 (17.2)	99 (32.0)	0.02
Less favourable/negative	83 (26.9)	74 (23.9)	

Chi-square tests were applied.

DISCUSSIONS

Electronic cigarettes produce harmful effects on health that should be part of health professionals' concerns. The majority of the participants, who are future medical and dental professionals felt responsible to take part in smoking cessation in their career. In a study conducted among the American population, the young adults expressed willingness to consult dental professionals to discuss vaping. Some even are willing to reduce or quit if they were enlightened that vaping do harm to their oral health (Martell et al., 2020). Another study suggested that college-age students perceived the benefits of e-cigarettes and continued the use despite not acknowledging the negative health consequences (Copeland et al., 2017). In a local study conducted in Selangor among the general public, the educated group mostly perceived vaping as less harmful than conventional cigarettes and as a useful tool for smoking cessation (Ibrahim et al., 2017).

The majority of participants from UiTM medical and dental undergraduates did not manage to score high in their knowledge section but did get their facts correct about vaping which includes vaping not a tool for smoking cessation. Though this is true, these undergraduates share the same perceived harm of vaping as less harmful to smoking. While low levels of knowledge are a possible barrier to providing education and guidance to patients (Pepper et al., 2014), it is suggested that medical and dental students should be equipped with sufficient understanding on vaping and/or smoking cessation approaches.

Health practitioners are in a unique position to affect cigarette smoking rates, which could lead to a reduction in related mortality and morbidity in the population (Stassen & Hammarfjord, 2015). This group of professionals has a role to play within society (Vulpinari et al., 2005), as they are seen as experts with the most knowledge about health in the community. They should be prepared to be involved in tobacco cessation and/or have sufficient understanding to convince smoker and e-cigarettes user the possible way to reduce their harmful habits. It has been shown that even a few minutes of smoking cessation advice improves long-term smoking abstinence rates by 5%, which can be increased by 50-70 per cent with adjunctive pharmacotherapy (Stassen & Hammarfjord, 2015). With the rapid increase of vape use in the population, electronic cigarette has been seen to be used as a tool for smoking cessation. E-cigarettes were effective for smoking cessation than nicotine-replacement therapy when both products were accompanied by behavioural support. E-cigarettes were found to be more effective in alleviating tobacco withdrawal symptoms and earned higher scores (Hajek et al., 2019). However, limited studies were proving that the use of e-cigarettes as a smoking cessation tool is a success and this information must be used with caution.

The influence of mass media in advertising e-cigarettes are increasing especially in social media. Half of the participants from this study were exposed to e-cigarettes from social media. According to Collins et al., although there is no evidence that exposure to e-cigarette advertisements affects the pattern use of e-cigarettes among the public, however, exposure to these advertisements affects the perceptions of the public towards e-cigarettes. Those who were exposed to e-cigarette marketing were associated with lower harm perceptions of e-cigarettes which could lead to intention to use e-cigarettes (Vogel et al., 2021; Pokhrel et al 2015). On the other hand, the use of social media platforms could be used as a medium to educate youth about e-cigarette harms (Lazard, 2021).

This study has some limitations. Participants were chosen from members of health students, and as a result, they are more likely to give less favourable feedback on electronic cigarette use as a smoking cessation aid, resulting in social desirability bias. In addition, the lack of comparison perceptions among medical and dental undergraduate students in UiTM who are currently using an electronic cigarette is another weakness and limits the full picture of the role that electronic cigarettes may have. Factors such as gender, ethnicity should be considered in future studies, as the perception of health risks associated with vaping was found strongly related to gender (Minhat et al., 2017).

CONCLUSION

There is no significant difference between the knowledge, attitude, perceived harm of vaping behaviour, and mass media exposure on vaping products between medical and dental undergraduate students in UiTM. UiTM medical and dental undergraduates have a less favourable attitude towards e-cigarettes but lack knowledge pertaining to the issue. They also perceived that the e-cigarettes to be less harmful to health than conventional cigarettes. This points out the urgent need to further educate future health professionals and also to provide clear guidelines at every level to regulate vaping behaviour among the population.

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