ELECTRONIC CIGARETTES KNOWLEDGE, ATTITUDE AND THEIR ASSOCIATED FACTORS AMONG THE COMMUNITY IN PAHANG, MALAYSIA

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Abstract

The proliferation of electronic cigarettes (e-cigarettes) or vaping users shows the current trend is now on the rise locally or globally. It has gained popularity because people are accepting it as an alternative to traditional tobacco smoking. There is a bundle of information about the advantages and disadvantages of e-cigarettes, with conflicting results that affect public understanding and attitude towards the usage of e-cigarettes. This study aimed to determine the level of knowledge and attitude on e-cigarettes including their associated factors among one of the communities in Pahang, Malaysia. A quantitative cross-sectional study was conducted among 394 community members using online self-administered questionnaires. The questionnaire consists of 3 parts: Socio-demographic, knowledge, and attitude toward e-cigarettes. The data were analysed by SPSS version 24, using descriptive and multivariate analysis of variance (MANOVA) to answer the research aim. 48.5% of the participants exhibited a high level of knowledge regarding e-cigarettes, while 84% of them exhibited a positive attitude towards e-cigarettes. A MANOVA showed statistically significant multivariate effects of gender and smoking status ($p < 0.001$). Further analysis of univariate ANOVA revealed significant main effects of gender and smoking status on the attitude of e-cigarettes. Post-hoc analysis indicated that both passive and non-smoker have significance effect towards attitude as compared to smoker ($p < 0.001$). This study showed that community members are more likely to be knowledgeable about e-smoking. However, holistic community education programs and health campaigns should be undertaken to shape attitudes towards e-smoking by providing accurate information on e-cigarettes and preventing the rise of e-cigarette users. The government should take action by adopting tobacco control measures comprehensively that including e-cigarette regulations.

Keywords: Knowledge, Attitude, E-Cigarette, Malaysia

Introduction

Recently, the use of e-cigarettes in Malaysia shows a significant rise as more e-cigarette users can be seen in some public places and a large growth of shops that sell e-cigarette products. The E-cigarette has become more popular due to its lower cost, attractive features, various flavours of e-liquid, and higher convenience compared to tobacco cigarettes together with widely advertised on social media that encourage adolescents to purchase it (1). Driezen et al. (2) reported that the prevalence of e-cigarette users in Malaysia increased from 0.8% in 2011 to 4.9% in 2019, while in 2020, 5.4% of Malaysian adults were e-cigarette users on a daily basis. Another survey of 10 countries from 2009 to 2013 reported that Malaysia is one of the countries with the highest prevalence of e-cigarette users approximately 14% (3), while a local survey among 4288 Malaysian showed that the overall prevalence of current, ever, former, and dual e-cigarette users were 3.2%, 11.9%, 8.6% and 2.3% respectively (4).

The safety of e-cigarette consumption remains controversial due to limited evidence even though abundant in vivo and in vitro studies have been conducted to understand better the impact of e-cigarette compounds on human health (5). An increasing number of case reports have been published on various issues related to using e-cigarettes, which are particularly common among young people and may be harmful to their health such as pneumonia, subacute bronchiolitis, mouth and tongue injuries, dental injuries, complex facial fractures, thermal injuries, nickel contact allergy, and fatal intoxication from liquid ingestion

(6). The long-term effects of e-cigarette use are still unclear, even though much research has been conducted about it (7). Some countries such as India, Brazil, Singapore, and Uruguay have banned the use of e-cigarettes because of their impact on young people and pose a risk to health (8 - 10). Even the U.S. Food and Drug Administration (FDA) announced a series of historic actions related to the sale and marketing of e-cigarettes since e-cigarettes user had reached 'epidemic proportion', especially among the youth (11). FDA also recognize the magnitude of the problem among adolescent e-cigarette user highlighting how quickly the tobacco control landscape has shifted over the past decade, and as a consequence, many organizations around the world have emphasised the need for regulatory agencies to act quickly to keep pace (12). In Malaysia, the sales, distribution, and advertising of e-cigarettes are regulated under the Control of Tobacco Product Regulations (CTPR) 2004, enforced by the Ministry of Health (MOH). However, the recent decision made by the government to exempt nicotine from Poison Act 1952 was unexpected because it will increase the availability and accessibility of nicotine-containing products including e-cigarettes (13).

Previous studies in Sarawak, Malaysia reported that 54.3% of 232 adult respondents had good knowledge of e-cigarettes (14). In contrast, Aghar et al. (15) found that 63.3% of 350 respondents in Lebanon exhibited a lower level of e-cigarette knowledge. A similar finding was reported in Jordan, in which their community had a low level of knowledge regarding e-cigarettes (16, 17). Uncertainty about the mechanism and constituents of e-cigarettes among the users might be because of unavailable or limited information on e-cigarettes (18). The emergence of e-cigarettes also has triggered positive or negative reactions from society. A study by Aghar et al. (15) showed that only 20.3% of participants portrayed a positive attitude towards e-cigarettes with 48.6% of participants believing e-cigarettes were effective for smoking cessation, 53.9% believed that e-cigarettes could help people to reduce or quit smoking and 44.3% believed that e-cigarettes should replace a regular cigarette. Despite many studies that have been conducted related to adolescents' attitudes towards smoking, only a few have extended the research to adolescents' attitudes towards e-cigarettes (19 - 21). Since e-cigarette is a relatively new product, and their long-term health effects are still largely unknown, the nationally representative data related to e-cigarettes are still inadequate in Malaysia (14). Therefore, this study aimed to determine the level of knowledge, attitude and its associated factors among the Malaysian community, specifically in Pahang regarding e-cigarettes.

Materials and Methods

Study design and sampling

A cross-sectional study was conducted from March 2021 until June 2021 in one of the districts in Pahang, Malaysia. Convenience sampling was applied to recruit the respondents in this study.

Sample size

The total population for the selected district is about 514,000 (22). Based on the sample size calculation using Raosoft software, with an additional 10% dropout, the total number of respondents required was 422. The inclusion criteria were 18 years and above, living in selected districts, able to read and understand English and/or Bahasa Melayu and willing to participate. The exclusion criteria for this study are cognitive impairments and current substance abuse.

Study instrument

A set of self-administered questionnaires that consists of three parts was used in the study. Part A consists of respondent's sociodemographic information such as gender, age, race, marital status, job status, education level and smoking status. Part B consists of 9 items that assessed the respondents' level of knowledge regarding e-cigarettes with a three points scale answers which are 'Yes', 'No' or 'I do not know', adopted from the study by Hafiz et al. (14). The level for knowledge was measured by the sum of the score obtained. The total knowledge scores (0-18) were categorised into 3 levels based on Bloom's cut-off: high level (80%-100%), moderate level (60%-79%), and low level (< 60%) (23). Part C assessed the attitude towards e-cigarettes that consisted of 13 items with 'Yes' or 'No', adopted from Aghar et al. (15). The total attitude scores (0-13) were categorised into 3 levels based on Bloom's cut-off: positive attitude (80%-100%), neutral attitude (60%-79%), and negative attitude (< 60%) (23). The pilot study was conducted among 30 respondents and the reliability of this questionnaire was calculated using Cronbach's Alpha with a value of 0.85.

Data collection

Due to the Covid-19 pandemic in Malaysia, the questionnaire was created in Google Forms. The link has been distributed online via 30 WhatsApp neighbouring groups and 7 Facebook groups of selected district communities. The purpose and information related to the study and written informed consent were mentioned in Google Forms and acquired before answering the questionnaire. The Patient Information Sheet's posted statement states that 'You are eligible if you live in District X'.

Data analysis

Data were entered and analysed using SPSS version 24. Descriptive analysis was conducted to determine the sociodemographic factors and level of knowledge and attitude. For continuous data, the results were presented as mean and standard deviation. Results for categorical data were presented as frequency and percentage. The significance level for analysis was set at a = 0.05 and all tests were two-sided. A multivariate analysis of variance

(MANOVA) test was used to compare between gender, age, race, marital status, education level and smoking status as the independent variables with a combination of multivariate dependent variables, knowledge and attitude. All independent factors are important and had an influence towards e-cigarette knowledge and attitude based on the previous study (24 - 26). However, due to the small size of the respondent in the group, variables such as race, marital status, and education level were combined for statistical analysis (Malay vs non-Malay, single vs married, higher education vs no higher education). Significant test results for MANOVA were based on *F* statistics, derived from Wilks' lambda. When the MANOVA was significant, the univariate ANOVA result was examined. In post hoc comparisons, the Bonferroni procedure was applied. The interaction term between the independent variables and model assumptions was checked.

Results

Demographic characteristics of the respondents

Table 1 shows the distribution of sociodemographic characteristics of the respondents. A total of 394 respondents participated in this study, which contributed to a 93.3% response rate. The majority of the respondents were female (58.4%), Malay (92.6%), single (52.3%), age ranged from 18-25 (46.7%), attended tertiary education (84.3%) and not smoking (80.7%).

Table 1: Sociodemographic data of respondents

	Frequency	Percentage
Demographics	**n = 394**	
Gender		
Male	164	41.6
Female	230	58.4
Age		
18-25	184	46.7
26-35	64	16.2
36-49	122	31.0
>50	24	6.1
Race		
Malay	368	93.3
Chinese	16	4.1
Indian	7	1.8
Others	3	0.8
Marital status		
Single	206	52.3
Married	179	45.4
Divorced	9	2.3
Educational level		
Primary schooling	2	0.5
Secondary schooling	60	15.2
University/college	332	84.3
Smoking status		
Smoker	47	11.9
Non-smoker	318	80.7
Passive smoker	29	7.4

Level of knowledge regarding e-cigarette

From 18 marks in the domain knowledge, 48.5% of the respondents earned a total knowledge score ≥ 15), indicating a high level of e-cigarette related knowledge (Table 2).

Table 2: Total knowledge score

	Frequency	Percentage
Low knowledge	76	19.3
Moderate knowledge	127	32.2
High knowledge	191	48.5

The most correct responses (82.5%) were in response to question 2 while the lowest percentage of correct responses (10.4%) was observed in response to question 3 (Table 3).

Table 3: Percentage distribution of respondents by item-wise knowledge of e-cigarettes

No.	Item of Questions	Yes	No	I do not know
1.	E-cigarettes can contain nicotine.	78.4%	5.3%	16.2%
2.	E-cigarettes are addictive.	82.5%	7.1%	10.4%
3.	E-cigarettes are not harmful to health.	10.4%	75.6%	14.0%
4.	E-cigarettes are less harmful to health than normal cigarettes.	28.9%	50.8%	20.3%
5.	E-cigarettes are potential cause of asthma attacks and allergies.	72.8%	5.6%	21.6%
6.	E-cigarettes have the same chemicals as normal cigarettes.	45.4%	31.7%	22.8%
7.	The health risk of e-cigarettes is the same as normal cigarettes.	58.6%	22.8%	18.5%
8.	E-cigarettes can be regulated by the government through laws.	73.6%	9.6%	16.8%
9.	E-cigarettes can be used in smoke-free places.	19.8%	63.2%	17.0%

Attitude towards e-cigarette

Most respondents (84%) earned a total attitude score ≥ 11 indicating a positive attitude toward e-cigarettes (Table 4).

Table 4: Total attitude score

	Frequency	Percentage
Positive attitude	331	84
Neutral attitude	54	13.7
Negative attitude	9	2.3

In the importance subscale of the attitude section, 92.9% of the respondents acknowledged the importance of the government regulating the use of e-cigarettes (Table 5).

Table 5: Percentage distribution of respondents by item-wise attitude towards e-cigarettes

No.	Item of Questions	Yes	No
1.	Should e-cigarettes be recommended to a non-smoker?	10.9%	89.1%
2.	Do you think e-cigarettes are harmful to health?	88.3%	11.7%
3.	Should the use of e-cigarettes be allowed in places that do not allow smoking?	20.6%	79.4%
4.	Would you consider someone who uses e-cigarettes a smoker?	83.2%	16.8%
5.	Do you think the use of e-cigarettes can lead to reliance?	83.5%	16.5%
6.	Do you think the government should regulate the use of e-cigarettes?	92.9%	7.1%
7.	Do you feel more comfortable using or openly talking about smoking e-cigarettes compared to cigarettes?	52.3%	47.7%
8.	Do you feel it is more socially acceptable to smoke e-cigarettes compared to cigarettes?	57.4%	42.6%
9.	Should e-cigarettes be used as a replacement for regular cigarettes?	37.6%	62.4%
10.	Do you think it is acceptable to experiment with e-cigarettes for pleasure?	22.1%	77.9%
11.	Do you think using e-cigarettes would be an effective way to help with smoking cessation?	46.6%	53.6%
12.	Do you think it is acceptable to use e-cigarettes as a smoking cessation method?	41.9%	58.1%
13.	Do you think e-cigarettes can help people cut down on cigarettes or quit smoking?	41.1%	58.9%

Association between socio-demographics and level of knowledge and attitude toward e-cigarette

The MANOVA analysis in one model that included all independent variables showed that gender (Wilks' lambda 0.960, $p < 0.001$) and smoking status (Wilks' lambda 0.967, $p < 0.001$) were both significant. Then, the univariate tests were examined and revealed significant main effects of gender and smoking status on the attitude of e-cigarettes (Table 6). In post hoc comparisons of smoker status, the Bonferroni procedure was applied and indicated that both passive and non-smoker have a significant effect towards attitude as compared to smoker ($p < 0.001$).

Table 6: An association of sociodemographic background with knowledge and attitude domain towards e-cigarettes

Factor	Dependent variable	F-stat	p-value	Partial Eta Square
Gender	Knowledge	1.034	0.310	0.003
	Attitude	16.002	**0.001**	0.040
Age	Knowledge	1.506	0.212	0.012
	Attitude	1.337	0.262	0.010
Race	Knowledge	0.183	0.669	0.001
	Attitude	1.171	0.280	0.003
Marital status	Knowledge	0.353	0.553	0.001
	Attitude	0.049	0.826	0.001
Educational Level	Knowledge	0.638	0.425	0.002
	Attitude	0.178	0.674	0.001
Smoking status	Knowledge	1.191	0.305	0.006
	Attitude	6.395	**0.002**	0.032

A multivariate analysis of variance was conducted. There is no interaction detected amongst independent variables and all assumptions of the model were met.

Discussion

The level of knowledge about e-cigarettes can vary among different communities and countries. Some people may deeply understand e-cigarettes while others may have low knowledge or even misinformation about it. This study revealed that the respondent's level of knowledge regarding e-cigarettes was very good in which more than a third quarter of the respondents obtained a score of more than 50%. This result is considerably higher as compared to previous local studies (14) and abroad (15 - 17). The possible explanation is that the majority of the respondents in this study were graduates and young adults, so they may have good knowledge about e-cigarettes. Understanding the harmful effects of smoking is important, because it will help individuals to recognize their own situation regarding smoking, leading to positive changes (27). Moreover, different tools also influence the variability of the result. However, it is important to note that the usage of e-cigarettes is currently evolving area of research, and emerging of new knowledge is arising. By having accurate and up-to-date information, an individual and decision-makers can evaluate the potential benefits and risks of e-cigarettes and make informed decisions about their regulation and use. Therefore, health education activities for the community should be implemented continuously to provide up-to-date and accurate information about e-cigarettes.

People may have different attitudes towards e-cigarettes. Research showed that some people believe that e-cigarette is less harmful than a cigarette, it does not contain any or only limited amounts of nicotine (20) and help to quit smoking conventional cigarette (15, 20). However, the majority of the respondents in this study did not agree with the above statements. Given that majority of the respondents in this study were graduated, it is possible that they have a positive attitude toward e-cigarettes compared to other studies. Additionally, the majority of the respondents in this study expressed a strong attitude that the government should control the use of e-cigarettes. A similar finding was reported in America, in which participants were more supportive of restricting e-cigarette policies to protect youth (28). Kennedy et al. (29) reported that 22 countries globally had regulated e-cigarettes using existing regulations, 25 countries had enacted new policies to regulate e-cigarettes, 7 countries had amended existing legislation; 14 countries applied a combination of new or amended and existing regulations. It shows that a variety of legal mechanisms can be applied to control the e-cigarette and the implementation of the regulation depending on the country such as regulations on marketing and advertising, age restrictions on purchasing e-cigarettes, and taxation on these products to discourage use.

This study revealed that gender and smoking status were significantly associated with attitudes toward e-cigarettes ($p < 0.05$). Generally, men are more likely to smoke than women, thus their attitude towards e-cigarettes tends to be different compared with women. Additionally, this could also be attributed to the differences between gender in perceiving and practising risk-taking behaviour (30). Similar findings regarding the association between gender and attitude were reported in Malaysia (31) and Saudi Arabia (7). In terms of the significant association between smoking status and attitude, similar results were reported among male school adolescents in Thailand (1). Another study in Jordan found that smoker has a lower mean score of attitudes toward e-cigarettes ($p < 0.001$) than those who did not (32).

This study has several limitations. Firstly, this study was limited to a community-based convenience sample recruited from only one district in Pahang, so generalisation is limited. In the future, surveys with larger sample sizes and conducted in more districts and states in Malaysia are needed to understand the knowledge and attitude about e-cigarettes better. Moreover, convenience sampling lacks clear generalizability (33), which introduces sampling bias and sampling error, possibly leading to an overrepresented or underrepresented population. Secondly, compared with face-to-face recruitment, online surveys may be more difficult to ensure data quality. This study also acknowledges that the study population was skewed towards younger and more educated participants even though these two factors (age and education) did not show any significant association with either the knowledge or the attitude scores obtained.

Conclusion

In conclusion, this study suggests that healthcare providers need to understand the community members' knowledge and attitudes towards e-cigarettes as this will influence their informed decision about it. Therefore, it is important to conduct health education programs that consist of correct and up-to-date information concerning e-cigarettes such as ingredients, nicotine content, addictive properties, and health risk in the community.

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Competing interests

The authors declare that they have no competing interests.

Ethical Clearance

The study was approved by Kulliyyah of Nursing Post Graduate Research Committee and the International Islamic University Malaysia Research Ethics Committee (Ethic no: IREC 2021-KON/66). The consent was obtained from the participants and all the information was ensured in terms of anonymity and confidentiality.

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