

Knowledge and Perceived Benefits of Electronic Cigarette Among Users In Klang Valley, Malaysia

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Abstract

Electronic cigarette (e-cigarette) is a battery powered device which imitates the feel and experiences of smoking a conventional cigarette. This device has gained considerable attention since their inception into the European and American markets in the early 2000s and have become increasingly common in many countries, including Malaysia. As of 2020, 33.7% of Malaysians reported ever using ECs and 5.4% used ECs on daily basis. The aim of this study was to gauge the level of knowledge and perceived benefits of e-cigarette users in Klang Valley, Malaysia. This study was conducted at an e-cigarette stall in Kuala Lumpur Downtown Night Market, Cheras, Kuala Lumpur. Questionnaires were given to 73 respondents that met both the inclusion and exclusion criteria. Out of 73 participants, 54.8% were regarded as having a medium level of knowledge while the rest were under high level of knowledge. Findings from this study also showed that there are no significant associations between duration of e-cigarette usage and class of income with the levels of knowledge of the e-cigarette users on this device. High percentage of respondents strongly agreed that e-cigarette had positive perceived benefits which outweigh the risks. As a conclusion, this battery powered device may be considered as an alternative to nicotine replacement therapy (NRT) available in an attempt to quit smoking.

Keywords: Electronic Cigarette, E-Cigarette, Perceived Benefits, Knowledge, E-Cig, Smoking Cessation, Nicotine Replacement Therapy, Malaysia

Introduction

In recent years, the use of electronic cigarettes (e-cigarettes) has garnered significant attention globally, presenting a complex landscape of public health challenges and opportunities. Malaysia, particularly the bustling urban region of Klang Valley, has not been immune to this trend. As the prevalence of e-cigarette use rises, it becomes imperative to investigate the knowledge and perceived benefits of these devices among users within this dynamic Malaysian setting.

E-cigarettes, also known as electronic nicotine delivery systems (ENDS), are battery-operated devices that vaporize a liquid solution containing nicotine, flavorings, and other chemicals, which users inhale. Initially marketed as a safer alternative to traditional tobacco smoking, e-cigarettes have since evolved into a multifaceted phenomenon with diverse implications for public health [1]. Despite ongoing debates surrounding their efficacy as smoking cessation aids and potential long-term health effects, e-cigarettes have gained popularity among individuals of various demographics, including youth and adults [2].

In the context of Malaysia, where tobacco control measures have been implemented rigorously, understanding the knowledge and perceived benefits of e-cigarettes among users is of paramount importance. Malaysia's regulatory framework includes prohibitions on smoking in public places, restrictions on tobacco advertising, and taxation on tobacco products, which may influence patterns of e-cigarette use and perceptions of harm reduction [3]. However, limited research has been conducted to

elucidate the factors driving e-cigarette use and the extent to which users are aware of their potential benefits and risks within this sociocultural context.

Moreover, the Klang Valley region, encompassing Kuala Lumpur and its surrounding urban areas, represents a diverse and dynamic microcosm of Malaysian society. Its cosmopolitan nature, coupled with socioeconomic disparities and cultural influences, may shape attitudes and behaviors related to e-cigarette use in unique ways. By examining the knowledge and perceived benefits of e-cigarettes among users in Klang Valley, insights can be gleaned to inform targeted interventions and policies aimed at mitigating potential harms and maximizing public health outcomes.

This study seeks to address this gap by conducting a comprehensive investigation into the knowledge and perceived benefits of e-cigarettes among users in Klang Valley, Malaysia. Through rigorous empirical research, we aim to elucidate the factors influencing e-cigarette use behaviors, assess users' understanding of the risks and benefits associated with these devices, and identify potential avenues for harm reduction strategies tailored to the Malaysian context.

Materials And Method

Sampling Size

The sample size of 73 e-cigarette users was obtained using an online calculator to generate the proportion sample size from www.openepi.com. Confidence level of 95% and prevalence of 5% were used in this study. A population of roughly 7.5 million was taken from a geographical dictionary or directory website in conjunction with atlas (www.world-gazetteer.com).

Study site

The study was conducted at an e-cigarette stall in Kuala Lumpur Downtown Night Market, Bandar Tun Razak, Cheras, Kuala Lumpur for a period of one month. The

location was chosen as the study site because it is one of the popular spots for e-cigarette users in Klang Valley. Respondents were targeted during the weekends which were on Friday, Saturday and Sunday from 10pm to 2am.

Inclusion and Exclusion criteria

E-cigarette users were included in the study if they live in Klang Valley during when this study was done, 18 years old and above and currently using e-cigarette. The e-cigarette users were excluded from this study if they had been using e-cigarette for less than 3 months, they were never a conventional cigarette smoker before and if they have asthma or any other obstructive pulmonary diseases.

Questionnaire

The tool used for the data collection in this study was validated questionnaires. The questionnaires were adopted and adapted from previous studies [4,5]. The questionnaires were used to gauge the level of knowledge of users on e-cigarette and their perceived benefits of e-cigarette use as outlined in Tables 1 and 2.

Data Analysis

Descriptive analysis was presented in percentage (%) and association test was analysed using Chi-square Test using the Statistical Package for Social Sciences (SPSS) software version 20.0 for Windows.

Results and Discussion

Level of Knowledge on Electronic Cigarette

In this study, level of knowledge was categorized into three groups which were low level of knowledge with a score less than 2, moderate level of knowledge with a score of 2 to 5 and high level of knowledge with a score more than 5. A low level of knowledge was not shown in the results because no participant scored below 2. Most of the respondents in this study had a medium level

Table 1: Questionnaire on knowledge on electronic cigarette		
Questionnaire on knowledge on electronic cigarette: <i>Soal selidik berkenaan pengetahuan tentang rokok elektronik :</i>		
Question/Soalan	Yes/Ya	No/Tidak
Do you know that the liquid of electronic cigarette contains nicotine? <i>Adakah anda tahu bahawa cecair rokok elektronik mengandungi nikotin?</i>		
Do you know that electronic cigarette contains the following :	Yes/Ya	No/Tidak
a. <i>Adakah anda tahu bahawa rokok elektronik mengandungi bahan berikut: Propylene glycol/Propylene glycol</i>		
b. <i>Diethylene glycol/Dietyleneglycol</i>		
c. <i>Vegetable glycerin/Glycerintumbuh-tumbuhan</i>		
Do you know that electronic cigarette can cause addiction? <i>Adakah anda tahu bahawa rokok elektronik boleh mengakibatkan ketagihan?</i>		
How would electronic cigarette be best described? <i>Bagaimana rokok elektronik tepat digambarkan?</i>		
a. <i>Nicotine replacement therapy/Terapipenggantinikotin</i>		
b. <i>Harm reduction nicotine-delivery-system/ Sistem penghantaran nikotin yang kurang berbahaya</i>		
c. <i>Same with normal cigarette/Sama sepertirokokbiasa</i>		
Do you know that in Malaysia, the SALE of nicotine containing liquid of electronic cigarettes is an offense under the Poison Act 1952 and the Control of Drugs and Cosmetics Regulations 1984? <i>Adakah anda tahu bahawa di Malaysia, Penjualan cecair rokok elektronik yang Mengandungi nikotin adalah menyalahi undang-undang di Bawah Akta Racun 1952 dan Peraturan peraturan Kawalan Dadah Kosmetik 1984?</i>		

of knowledge with 54.8% while 45.2% were regarded as having high level of knowledge on e-cigarette (Table 3).

Association between the Level of Knowledge on Electronic Cigarette and Class of Income

Table 4 shows the association between the levels of knowledge on e-cigarette and the class of income. The highest percentage for the moderate level of knowledge was from the class of income between RM1000 to RM4000 with 42.5% (n=31), followed by the class of income less than RM1000 with 8.2% (n=6). The lowest percentage for the moderate level of knowledge was from the class of income

more than RM5000 with 4.1% (n=3). The highest percentage for the high level of knowledge was from the class of income between RM1000 to RM4000 with 32.9% (n=24), followed by income less than RM1000 with 8.2% (n=6). The lowest percentage for the high level of knowledge was from the class of income of more than RM5000 with 4.1% (n=3). A Chi-square test was performed to see the association between the levels of knowledge on e-cigarette and the class of income. It was found that there is no significant association between the levels of knowledge on e-cigarette and the class of income. These results suggest that the levels of knowledge of the e-cigarette users on e-cigarette are not affected by the class of income.

Table 2: Questionnaire on perceived benefits on the use of electronic cigarette					
Questionnaire on perceived benefits of electronic cigarette: Soal selidik berkenaan faedah tanggapan rokok elektronik:					
Question/Soalan	1	2	3	4	5
1. What noticeable changes have you experienced upon switching to electronic cigarette? <i>Apakah perubahan yang Dapat anda rasai apabila bertukar kepada rokok elektronik</i>					
a. Reduction in persistent cough. <i>Pengurangan dalam batuk berpanjangan.</i>					
b. Reduction in occurrence of shortness of breath. <i>Pengurangan dalam masalah sesak nafas.</i>					
c. Reduction in occurrence of sore throat. <i>Pengurangan dalam masalah sakit tekak.</i>					
d. Reduction in mouth dryness. <i>Pengurangan dalam masalah mulut kering.</i>					
e. Reduction in bad breath. <i>Pengurangan dalam masalah mulut berbau.</i>					
f. Reduction in craving for conventional cigarette. <i>Pengurangan dalam keinginan untuk merokok rokok biasa.</i>					
g. Increased in the general health. <i>Meningkatkan tahap kesihatan.</i>					
h. Increased in ability to perform exercise. <i>Meningkatkan keupayaan untuk melakukan senaman.</i>					
i. Increased in sense of taste. <i>Meningkatkan deria rasa.</i>					
j. Increased in sense of smell. <i>Meningkatkan deria bau.</i>					

Table 3: Level of knowledge of users on electronic cigarette	
Knowledge (%)	
Moderate (2-5)	High (>5)
54.8	45.2

Association between the Level of Knowledge on Electronic Cigarette and Duration of Electronic Cigarette Usage

This association was done in order to assess the improvement of knowledge after using e-cigarette for a period of time. Table 5

shows the association between the levels of knowledge on e-cigarette and duration of e-cigarette usage. The highest percentage for the moderate level of knowledge was from the duration of e-cigarette usage between 3 to 10 months with 28.8% (n=21). The lowest percentage for the moderate level of knowledge was from the duration of e-cigarette usage between 31 to 40 months with 0.0% (n=0). The highest percentage for the high level of knowledge was from the duration of e-cigarette usage between 3 to 10 months with 23.3% (n=17). The lowest

Table 4: Association between the levels of knowledge on electronic cigarette and class of income

Income	Knowledge (%)		(p value)
	Moderate (2-5)	High (>5)	
<RM1000	8.2	8.2	0.895 ^b
RM1000 - RM4000	42.5	32.9	
>RM5000	4.1	4.1	

^bChi-square test

Table 5: Association between the levels of knowledge on electronic cigarette and duration of electronic cigarette usage

Months of electronic cigarette usage	Knowledge (%)		(p value)
	Moderate (2-5)	High (>5)	
3-10	28.8	23.3	0.593 ^b
11-20	21.9	19.2	
21-30	4.1	1.4	
31-40	0.0	1.4	

^bChi-square test

percentage for the high level of knowledge was from duration of e-cigarette usage between 21 to 30 months and 31 to 40 months both with 1.4% (n=1). A Chi-square test was performed to see the association between the levels of knowledge on e-cigarette and duration of e-cigarette usage. It was found that there is no significant association between the levels of knowledge on e-cigarette and duration of e-cigarette usage. These results suggest that the levels of knowledge of the e-cigarette users on e-cigarette is not affected by the duration of e-cigarette usage.

Association between the Level of Knowledge on Electronic Cigarette and Age Group of Respondents

Table 6 shows the association between level of knowledge and respondents age. The highest percentage for the moderate level of knowledge was from respondents with age of 18 to 25 years old with 16.3% (n=11). The lowest percentage for the moderate level of knowledge was from

respondents with age of 46 to 50 years old with 0.0% (n=0). The highest percentage for the high level of knowledge was from respondents with age of 26 to 30 years old with 17.4% (n=12). The lowest percentage for the high level of knowledge was from respondents with age of 46 to 60 years old with 0.0% (n=0). A Chi-square test was performed to see the association between levels of knowledge with age of respondents. It was found that there is no significant association between the levels of knowledge and age of respondents. These results suggest that the difference in age did not affect the levels of knowledge of e-cigarette users.

Perceived Benefits of Electronic Cigarette among Users

The questionnaire included ten narratives aimed at eliciting feedback from users regarding the perceived benefits of e-cigarettes. Table 7 shows the percentage of perceived benefits reported by respondents on a Likert scale. Respondents were asked

Table 6: Association between levels of knowledge on electronic cigarette and age of respondents

Age	Knowledge (%)		(p value)
	Moderate (2-5)	High (>5)	
18-25	16.3	10.9	0.706 ^b
26-30	12.3	17.4	
31-35	13.6	15.1	
36-40	4.1	2.8	
41-45	5.5	1.4	
46-50	0.0	0.0	
51-55	1.4	0.0	
56-60	1.4	0.0	

^bChi-square test

Table 7: Mean of percentage of perceived benefits claimed by the respondents

Perceived benefits	1 Strongly disagree (%)	2 Disagree (%)	3 Neutral (%)	4 Agree (%)	5 Strongly agree (%)
Reduction in persistent cough.	0.0	0.0	5.0	13.7	79.5
Reduction in occurrence of shortness of breath.	0.0	0.0	1.4	15.1	83.6
Reduction in occurrence of sore throat.	0.0	0.0	6.8	16.4	76.7
Reduction in mouth dryness.	1.4	1.4	5.5	16.4	75.3
Reduction in bad breath.	0.0	0.0	1.4	16.4	82.2
Reduction in craving for conventional cigarette.	1.4	1.4	13.7	50.7	32.9
Increase in general health.	0.0	0.0	6.8	39.7	53.4
Increase in ability to perform exercise.	0.0	2.7	5.5	21.9	69.9
Increase in sense of taste.	1.4	1.4	5.5	17.8	74.0
Increase in sense of smell.	1.4	1.4	4.1	20.5	72.6

to rate their agreement using the Likert scale, with options ranging from strongly agree (score 5) to strongly disagree (score 1). According to Table 7, for nine out of the ten perceived benefits narratives, over 50% of respondents strongly agreed (score 5). These included reductions in persistent cough, shortness of breath, sore throat,

mouth dryness, bad breath, as well as improvements in general health, exercise performance, taste, and smell perception. However, the narrative concerning a reduction in craving for conventional cigarettes received the lowest percentage of strongly agree responses. Notably, none of the respondents strongly disagreed (score

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1) or disagreed (score 2) with five of the perceived benefits narratives, which included reductions in persistent cough, shortness of breath, sore throat, bad breath, and improvements in general health. Additionally, less than 15% of respondents provided neutral responses (score 3) for all ten perceived benefits narratives. In summary, the overall consensus among respondents suggests that transitioning to e-cigarettes has yielded positive outcomes.

Discussion

Findings from this study show that there is no significant association between levels of knowledge on e-cigarette with the class of income, duration of e-cigarette usage and age of respondents. Levels of knowledge do not rely on the increment of the income as well as duration of using e-cigarette and age of respondents. There are other contributing factors towards the level of knowledge. One of the factors is mass media. Mass media campaigns can raise awareness and change attitudes about the risk of using tobacco and benefits of quitting [6]. E-cigarette advertisements and related promotion activities are spreading to adolescents and internationally through the internet [7]. The spreading of the information indirectly contributes to the level of knowledge regarding e-cigarette.

Based on the results obtained, respondents from the age group of 18 to 35 years old had the highest percentage of knowledge. This may be due to their exposure towards e-cigarette on social media. In addition, e-cigarette is being published via bloggers and specific brand websites for this device. Thus, these phenomena actually targeting youngsters to gauge some information regarding this electronic nicotine delivery device system (ENDS). Examples of e-cigarette brands websites available are Vapor4Life, ProVape and MadVape. This is one of the factors that influenced the levels of knowledge of respondents based on age.

Besides, limited studies and published facts about e-cigarette also do affect the level of knowledge of respondents towards this device. The limited published research about the safety, composition, efficacy and public health impact of e-cigarette increases the concerns of public regarding this device [8]. Questions regarding regulations and ingredients of liquid nicotine can be answered well if the respondents are well aware of the composition and safety of the device. Knowledge on the ingredient and device itself can be obtained through exposure and awareness campaigns that will increase the public concerns regarding e-cigarette[9]. The results from this study and evidences obtained suggested that knowledge are associated with other contributing factors instead of class of income, duration of e-cigarette usage and age.

E-cigarette is an alternative to the nicotine replacement therapy (NRT) available. The only difference is e-cigarette is a battery powered nicotine delivery device. Examples of NRT are nicotine gum, nicotine patch and nicotine lozenge [10]. E-cigarette appears to help smokers transition to a less harmful replacement tool, thereby maintaining cigarette abstinent due to their perceived benefits compared to other nicotine replacement therapy [11].

Findings from this study showed that e-cigarette does have perceived benefits based on the response from the respondents. Respondents were asked to answer the perceived benefits narratives based on the likert scale of score 1 (strongly disagree) up to score 5 (strongly agree). High percentage of respondents strongly agreed that e-cigarette perceived benefits of reduction in persistent cough (79.5%). This is because of the composition in e-cigarette such as propylene glycol, diethylene glycol, ethylene glycol, nicotine and glycerin that do not give irritation to the consumers [12]. Respondents also perceived that e-cigarette does help in reduction of occurrence of shortness of breath (83.6%). In comparison to conventional cigarette that contains 4000 chemical constituents, consists of

carcinogenic constituents such as tar which is nicotine free, dry, particulate mass of tobacco smoke that would accumulate and darken the lungs which in turn lead to shortness of breath. In addition, respondents also perceived that e-cigarette does help in reduction in craving for conventional cigarette (32.9%) [12].

Previous study revealed that 70% to 90% of e-cigarette consumers have less desire to smoke when using e-cigarette and this is what perceived by the respondents from this study [13]. This is also supported that e-cigarette can reduce desire to smoke and nicotine withdrawal symptoms 20 minutes after use [14]. High percentage of respondents also perceived that e-cigarette do help in reduction of occurrence of sore throat (76.7%), reduction in mouth dryness (75.3%), reduction in bad breath (82.2%), increased in general health (53.4%), increased in ability to perform exercise (69.9%), increased in sense of taste (74.0%) and increased in sense of smell (72.6%) significantly.

Results of this study regarding perceived benefits of e-cigarette suggested that this device has several benefits that outweigh the negative assumptions.

Despite the insights gained from this study, further research is warranted to deepen our understanding of e-cigarette usage and perceptions. Future studies could explore additional factors that may influence knowledge levels and perceptions among e-cigarette users, such as educational background, smoking history, and exposure to marketing messages. Additionally, longitudinal studies tracking changes in knowledge and perceptions over time could provide valuable insights into the evolving landscape of e-cigarette use. Moreover, qualitative research methods, such as interviews and focus groups, could offer nuanced perspectives on the motivations and experiences of e-cigarette users. By addressing these research gaps, future studies can contribute

to a comprehensive understanding of e-cigarette usage patterns and inform evidence-based strategies for public health intervention and policy development.

Conclusion

In this study, the majority of respondents exhibited moderate knowledge (54.8%), while 45.2% demonstrated high knowledge levels. Associations between knowledge levels and income class, duration of e-cigarette usage, and age group were explored, revealing no significant relationships, suggesting that these factors do not influence knowledge levels among e-cigarette users. Additionally, respondents overwhelmingly agreed with perceived benefits of e-cigarettes, with positive outcomes such as reduced cough, shortness of breath, sore throat, and improved general health, indicating favorable perceptions of e-cigarette usage.

References

1. Czoli, C. D., White, C. M., Reid, J. L., O'Connor, R. J., Hammond, D., & Thrasher, J. F. (2019). Awareness and interest in IQOS heated tobacco products among youth in Canada, England and the USA. *Tobacco Control*, 28(2), 167–173.
2. Giovenco, D. P., Delnevo, C. D., Hitchman, S. C., & Cohen, J. E. (2019). Changes in the cigarette consumption trajectory and cigarette consumption fluctuation in response to flavorsome cigarette bans among US adult smokers, 2011–2018. *Tobacco Control*, 28(3), 269–275.
3. Institute for Public Health. (2019). National Health and Morbidity Survey 2019: Adolescent Health Survey Findings. Ministry of Health Malaysia.
4. Heavner, K., et al. (2009). Survey of smokers' reasons for not switching to safer sources of nicotine and their willingness to do so in the future. *Harm Reduction Journal*, 14(6).
5. Etter, J-F., & Bullen, C. (2011). Electronic cigarette: users' profile, utilization,

satisfaction and perceived efficacy. Published in *Addiction*, 10, 1360-0443.

6. Bala, M. M., Strzeszynski, L., & Topor-Madry, R. (2017). Mass media interventions for smoking cessation in adults. *The Cochrane database of systematic reviews*, 11(11), CD004704. <https://doi.org/10.1002/14651858.CD004704.pub4>

7. Struik, L. L., Dow-Fleisner, S., Belliveau, M., Thompson, D., & Janke, R. (2020). Tactics for Drawing Youth to Vaping: Content Analysis of Electronic Cigarette Advertisements. *Journal of medical Internet research*, 22(8), e18943. <https://doi.org/10.2196/18943>

8. Marques, P., Piqueras, L., & Sanz, M.-J. (2021). An updated overview of e-cigarette impact on human health. *Respiratory Research*, 22(1), 151. doi:10.1186/s12931-021-01737-5

9. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. *E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General* [Internet]. Atlanta (GA): Centers for Disease Control and Prevention (US); 2016. Chapter 1, Introduction, Conclusions, and Historical Background Relative to E-Cigarettes. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK538684/>

10. Colon-Rivera, H., Aoun, E., & Vaezazizi, L. (2023). Tobacco and other nicotine products. In *Addiction Psychiatric Medicine* (pp. 67–72). doi:10.1016/b978-0-323-75486-6.00007-2

11. Ashour A. M. (2023). Use of Vaping as a Smoking Cessation Aid: A Review of Clinical Trials. *Journal of multidisciplinary healthcare*, 16, 2137–2144. <https://doi.org/10.2147/JMDH.S419945>

12. National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Population Health and Public Health Practice; Committee on the Review of the Health Effects of Electronic Nicotine Delivery Systems; Eaton DL, Kwan LY, Stratton K, editors. *Public Health Consequences of E-Cigarettes*. Washington (DC): National Academies Press (US); 2018 Jan 23. 5, Toxicology of E-Cigarette Constituents. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK507184/>

13. Elkalmi, R. M., Bhagavathul, A. S., Ya'u, A., Al-Dubai, S. A., Elsayed, T. M., Ahmad, A., & Mohamed, W. (2016). Familiarity, perception, and reasons for electronic-cigarette experimentation among the general public in Malaysia: Preliminary insight. *Journal of pharmacy & bioallied sciences*, 8(3), 240–247. <https://doi.org/10.4103/0975-7406.180768>

14. Dawkins, L., Turner, J., Hasna, S., & Soar, K. (2012). The electronic-cigarette: effects on desire to smoke, withdrawal symptoms and cognition. *Addictive behaviors*, 37(8), 970–973. <https://doi.org/10.1016/j.addbeh.2012.03.004>