



# Knowledge and attitudes on smoking cessation of e-cigarettes: a mixed-methods study of pharmacy students in Surabaya, Indonesia

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## Keywords

Attitude • E-cigarettes • Knowledge • Pharmacist students • Smoking cessation

## Summary

**Background.** Pharmacy students as candidates for health workers who will take part in smoking cessation. Knowledge and attitudes of smoking cessation can help map the behavior of pharmacists in the future. This study aimed to explore knowledge and attitudes on smoking cessation of e-cigarettes with the mixed methods study of pharmacist students.

**Method.** This research was conducted in Januari-Juni 2021 in Surabaya. The research design was mix-method with sequential explanatory strategy. The variables were knowledge and attitudes on smoking cessation of e-cigarettes. The sample in this qualitative approach was derived from a sample of quantitative data. Respondents were interviewed in depth until the data reached the saturation level in order to obtain good and usable qualitative data.

**Results.** This study involved 31 respondents. The highest level

of knowledge about dangers of e-cigarettes, especially related to nicotine (100% of respondents answered correctly). The highest positive level of attitude about dangers of e-cigarettes, especially e-cigarettes harmful to passive smokers (27% of respondents had positive attitude). Cigarettes were harmful to lung and cardiovascular health, regarding the dangers of passive smoking, some agree and disagree. Non-smokers didn't need to be recommended for e-cigarettes, e-cigarettes can be recommended for tobacco smokers, e-cigarettes cause addiction, and e-cigarettes can be a good recommendation for those who want to carry out smoking cessation. Regulation of e-cigarettes in Indonesia was considered to be lacking and needs to be improved.

**Conclusions.** Pharmacist students have a high level of knowledge and a positive attitude towards smoking cessation.

## Introduction

Smoking is a public health threat in the world that causes death. Indonesia is the fifth largest producer of tobacco leaf and also the largest producer and exporter of cigarettes in the world. In fact, Indonesia is also the third largest cigarette consumer in the world [1]. Indonesia is one of the countries with the largest smoking prevalence in the world. In 2012 the prevalence percentage of male smokers, which was 67%, was much higher than female smokers, which was 2.7% [2]. The government has tried to limit the number of smokers, one of which is by restricting cigarette advertising in Government Regulation No. 109/2012 article 39 [3], but the number of smokers is still large. Several types of diseases that can be triggered by smoking include cardiovascular disease, chronic respiratory disease, digestive disorders, which can cause death [4-6].

The losses due to smoking in terms of health and economy make the smoking cessation program the main choice of treatment for smokers. Although many pharmaceutical products have been used to stop smoking, they are only able to make smokers stop temporarily [7, 8]. This is because the nicotine in cigarettes causes dependence. Nicotine stimulates acetylcholine receptors on dopamine-

containing neurons, thereby causing an increase in dopamine in the central brain reward system. Nicotine peaks, a temporary activation of the brain reward system, followed by a gradual decrease in nicotine levels, to a point of withdrawal that can only be relieved by smoking a cigarette. Nicotine causes a pleasant feeling that makes smokers addicted to continue smoking. When smokers try to reduce or try to quit smoking, it can cause symptoms of anxiety and restlessness. The longer the nicotine content in the body, the stronger the smoking behavior, so that smokers are increasingly difficult to leave cigarettes [9]. Research by Lorensia et al. [10], shows that quitting smoking is complex and not easy. All of the study respondents who failed to quit smoking had known the dangers of smoking, and had tried to quit smoking because smoking affects health and economic factors.

Now many smokers are switching to using e-cigarettes, which are increasing rapidly. E-cigarette users report buying e-cigarettes to help quit smoking, reduce cigarette consumption, and continue to want to 'smoking', but with a reduced risk of health hazards. Other surveys also show that many smokers try e-cigarettes for reasons that e-cigarettes can deliver nicotine into the bloodstream and reduce tobacco use [11-14]. In addition to providing

nicotine, e-cigarettes are believed to be able to change the habits of someone who is used to holding the cigarette to be smoked. E-cigarettes can help smokers to continue to consume cigarettes but without going through the burning process [15]. However, the use of e-cigarettes is still controversial.

However, there was not enough evidence to claim e-cigarettes can help a person to quit smoking and it was not recommended to recommend e-cigarettes because they can cause nicotine addiction problems and can increase the risk of chronic disease and other health problems. E-cigarette users have reason to use e-cigarettes as a smoking cessation therapy [12, 16]. In previous research on knowledge and attitudes as a predisposition to smoking behavior in the vapor community or e-cigarette users [17, 18]. There was a relationship between knowledge, attitudes, and perception of e-cigarette users [19-22]. In another study conducted by Aghar et al. [22], which was conducted on 3,652 respondents aged 18 to 24 years. The results showed that 63.3% of respondents had low or less knowledge of the use of e-cigarettes, but more than 50% of respondents had a positive attitude or supported the use of e-cigarettes. This study aimed to explore knowledge and attitudes on smoking cessation of e-cigarettes with the mixed methods study of pharmacist students. Pharmacists as one of the health workers play an important role in the smoking cessation program. University of Surabaya pharmacy students who are prospective pharmacists are required to carry out the role of pharmacy listed in the Good Pharmacy Practice guidelines which include four main activities, namely: promotive, preventive, curative and rehabilitative [23]. Activities that have been determined, promotive or preventive activities can be carried out in order to create vigilance for e-cigarette users [24].

## Method

### RESEARCH DESIGN

This study used mixed-method research method by combining two data, namely: quantitative data and qualitative data so as to produce a more comprehensive explanation. The design strategy was sequential explanatory strategy, so that quantitative data obtained in the form of the level of knowledge and attitudes of subjects who use e-cigarettes then the data was re-analyzed and used to obtain qualitative data with a sequential explanatory strategy design. Data collection was carried out from Januari-Juni 2021 in Surabaya, East Java, Indonesia, through filling out questionnaires. The ethics committee of the Stikes Harapan Bangsa approved the study protocols (No. 055/C/I/SHB/2021).

### RESEARCH VARIABLE

The variables were knowledge and attitudes on smoking cessation of e-cigarettes. Knowledge was divided into 2 groups, namely high (if the respondent answers the questionnaire with a correct value of > 60% of the

total knowledge questions) and low (if the respondent answers the questionnaire with a correct value of 60% of the total knowledge question). Attitudes were divided into 2 groups, namely positive and negative. The attitude level was good if the individual answers the attitude statement with a total score of more than 66.7% of the maximum score and the less attitude level when the individual answers the attitude statement with a total score of more than 66.7% of the maximum score.

### POPULATION AND SAMPLE RESEARCH

The population was male students at a private university in Rungkut sub-district, Surabaya. The criteria of this research subjects were: > 18 years old and no other respiratory or cardiovascular disease which can affect the measurement of lung function. The sampling method used was purposive and snowball sampling method. Respondents were recruited consecutively until data saturation. The respondents were encountered in several public places on campus where students commonly smoked. The smokers who were participants in this study were asked to introduce the authors to their friends/relatives who were then approached as participants.

### METHOD OF COLLECTING DATA IN STATISTICS AND DATA ANALYSIS METHOD

The questionnaires containing questions and statements aimed at determining the level of knowledge and attitudes towards the use of e-cigarettes. This instrument was designed from various research articles that have been traced and then validated and to determine whether an instrument is valid or not by looking at the  $r_{count}$  value. The value of  $r_{count}$  must be greater than the value of  $r_{table}$  so that the questionnaire was declared valid. The instrument reliability test was carried out by testing its reliability with SPSS 25 software using the Cronbach's method. The questionnaire was declared reliable if the Cronbach's alpha value was greater than 0.6.

The sample in this qualitative approach was derived from a sample of quantitative data that has been previously collected and each question point in the quantitative data was analyzed again. Respondents were interviewed in depth until the data reached the saturation level in order to obtain good and usable qualitative data. In collecting qualitative data this will be done by interviewing the respondents. The data from the interviews were analyzed in an early stage, namely transcribing the results of the coding interviews with the following coding stages: (1) Open coding by simplifying the results of interview transcripts with respondents. The results of the interviews were simplified according to the answers given by the respondents in order to represent the themes studied; (2) Axial coding which aims to organize various categories, link between these categories and find core categories; (3) Selective coding was the last stage, which was choosing the core category and connecting it with other categories to get the main theme in the research.

## Result

The research had been done, 31 respondents had been successfully obtained to fill out the questionnaire and continued with in-depth interviews. The characteristics of respondents were age, medical history, and profile history of using e-cigarettes (Tab. I). Most of respondents were in the age of 20-21 years (15 of 31) and had no comorbidities (18 of 31) (Tab. I).

Table II described the history of smoking e-cigarettes from the respondents. Most respondents use e-cigarettes for < 1 year (18 of 31) and use it every day (23 of 31).

The biggest reason for using e-cigarettes was wanting to quit smoking or as a switch from tobacco cigarettes (26 of 31).

The level of knowledge of respondents about e-cigarettes related to smoking cessation can be seen in Table III. There were 5 topics observed, namely dangers of e-cigarettes, their effects on health, the flow of e-cigarettes with smoking cessation, smoking cessation programs, and their relation to regulation. The highest level of knowledge about dangers of e-cigarettes, especially related to nicotine (100% of respondents answered correctly). The lowest average score on the topic of the

**Tab. I.** Frequency distribution of characteristics.

Respondent characteristics		Frequency (n: 31)	Percentage (%)
Age (years)	18-19	14	45.16
	20-21	15	48.39
	22-23	2	6.45
Disease history	Dyspepsia	10	32.36
	Hipertensi	3	9.68
	Tidak ada penyakit penyerta	18	58.06

**Tab. II.** Frequency distribution of e-cigarette use history.

Frequency distribution of e-cigarette use history		Frequency (n: 31)	Percentage (%)
Long time using e-cigarettes	1 year	13	41.96
	< 1 year	18	58.06
Frequency of using e-cigarettes	Every day	23	74.19
	Often (> 3x a week)	5	16.13
	Sometimes (1-3x a week)	3	9.68
Reasons for using e-cigarettes	Want to quit smoking (previously/currently using cigarettes)	26	83.87
	Just want to try	5	16.13
For those who want to quit smoking with e-cigarettes (n: 26). The desire to do smoking cessation before	Ever	28	90.32
	<i>Economic factor</i>	8	<b>25.81</b>
	<i>Health factor</i>	13	<b>41.94</b>
	<i>Environmental factor</i>	5	<b>16.13</b>
	<i>Self factor</i>	2	<b>6.45</b>
	Never	3	9.68
Reasons for failure to quit smoking that have been done before	Discomfort in the mouth	12	38.71
	Restlessness and headache	10	32.26
	The feeling of wanting to smoke again due to environmental factors	6	19.35
	Never tried to quit smoking	3	9.68
Reasons for smoking using e-cigarettes	Nicotine reduction can be self-regulated	20	64.52
	Cheaper than tobacco cigarettes	6	19.35
	Does not cause bad breath	4	12.90
	Does not cause smoke	1	3.23
The benefits that have been obtained in the use of e-cigarettes on the frequency of smoking	Quit smoking tobacco	5	16.13
	Frequency is decreasing	16	51.61
	Permanent	7	22.58
	The frequency of smoking actually increases	3	9.68
Benefits of using e-cigarettes on health	Breath feels easier	11	35.48
	Weight begins to increase/appetite increases	8	25.81
	Reduced bad breath	5	16.13
	Permanent	7	22.58

**Tab. III.** Knowledge of e-cigarette smoker related to smoking cessation.

Knowledge of e-cigarette smoker related to smoking cessation		Respondents who answered correctly	
		Frequency	Percentage (%)
Knowledge about the dangers of e-cigarettes	Nicotine content	31	100
	Propylene glycol content	28	90.32
	Flavoring content	25	80.65
The dangers of e-cigarettes for health	Dangers for lung and cardiovascular function	27	87.10
	Relationship with nutritional intake due to decreased appetite	23	74.19
	The risk of drug abuse	24	77.42
The role of e-cigarettes in smoking cessation	Use of e-cigarettes with gradual reduction in nicotine (reduces addiction)	30	96.77
	The use of e-cigarettes in reducing the risk of disease	27	87.10
	The difference between e-cigarettes and tobacco cigarettes is related to health	17	54.84
Smoking cessation program	Relation to medicine	30	96.77
	Relation to physical activity	17	54.84
	Relation to healthy diet	17	54.84
	Relation to comorbidities	29	93.55
E-cigarette regulations and smoking cessation programs	E-cigarette regulations in Indonesia	17	54.84
	Regulation of smoking cessation program in Indonesia	19	61.29

role of e-cigarettes related to smoking cessation, which is related to the difference between e-cigarettes and tobacco cigarettes (54.84% of respondents answered correctly); and smoking cessation program in relation to physical activity (54.84% of respondents answered correctly) and relation to a healthy diet (54.84% of respondents answered correctly); and regulation of e-cigarettes in Indonesia (54.84% of respondents answered correctly) (Tab. III).

The level of attitude of respondents about e-cigarettes related to smoking cessation can be seen in Table IV. There were 3 topics observed, namely the dangers of e-cigarettes, role e-cigarettes in smoking cessation, and their relation to regulation. The highest positive level of attitude topic about dangers of e-cigarettes, especially e-cigarettes harmful to passive smokers and used of e-cigarettes the best choice in smoking cessation (27 of respondents had positive attitude). The lowest average score on regulation of e-cigarettes in Indonesia (5 of

respondents had positive attitude) (Tab. IV). Table V showed the results of the classification of knowledge and attitudes of e-cigarette smokers related to smoking cessation, indicating that most respondents had high level of knowledge (921 of 31) and most respondents also had positive attitude level (18 of 31). The results of in-depth interviews with several snippets of respondents' answers can be seen in Table VI.

## Discussion

Most respondents were between 20-21 years old (Tab. I), which was young age. Age can affect a person's knowledge and attitudes. Aging is associated with two areas of change that may increase the importance of knowledge in later life. First, aging is associated with declines in efficiency of cognitive processes. Second, knowledge, representing the long-term products of

**Tab. IV.** Attitude of e-cigarette smoker related to smoking cessation.

Attitude of e-cigarette Smoker related to Smoking Cessation		Respondent's answer (n: 31)	
		Positive	Negative
The dangers of e-cigarettes for health	Are e-cigarettes harmful to lung and cardiovascular health?	21	10
	Are e-cigarettes harmful to passive smokers?	27	4
The role of e-cigarettes in smoking cessation	Should e-cigarettes be recommended to non-smokers?	6	25
	Should e-cigarettes be recommended for tobacco smokers?	11	20
	Do e-cigarettes cause dependence/addiction?	17	14
	Is the use of e-cigarettes the best choice in smoking cessation?	27	4
E-cigarette regulations and smoking cessation programs	Is there a need for special regulations for e-cigarettes?	5	26
	Is smoking regulation in Indonesia correct?	13	18

**Tab. V.** Classification of knowledge and attitude of e-cigarette smoker related to smoking cessation.

	Classification	Frequency (n: 31)	Percentage (%)
Knowledge	High	21	67.74
	Low	10	32.26
Attitude	Positive	18	58.06
	Negative	13	41.93

**Tab. VI.** In-depth interview findings.

Topics	Question	Quote respondents answer
The dangers of e-cigarettes for health	Are e-cigarettes harmful to lung and cardiovascular health?	<p><i>"I think smoking is harmful to health, but health factors are also influenced by genetics and heredity"</i></p> <p><i>"Smoking is dangerous because it can cause chronic lung disease, lung cancer, or complications of heart disease. Especially when it comes to old age"</i></p> <p><i>"I don't think it's dangerous, because nicotine levels are low"</i></p>
	Are e-cigarettes harmful to passive smokers?	<p><i>"E-cigarettes tend to be safer for passive smokers than tobacco cigarettes, because e-cigarette smoke does not contain harmful substances"</i></p> <p><i>"Probably not dangerous, because it doesn't burn tobacco like tobacco cigarettes"</i></p>
	Should e-cigarettes be recommended to non-smokers?	<i>"no need, because it can cause addiction due to nicotine"</i>
	Should e-cigarettes be recommended for tobacco smokers?	<p><i>"Yes, because quitting smoking can use e-cigarettes by reducing nicotine levels gradually"</i></p> <p><i>"No, because in Indonesia, e-cigarettes have not officially become part of the smoking cessation program"</i></p>
The role of e-cigarettes in smoking cessation	Do e-cigarettes cause dependence/addiction?	<i>"Yes, of course because it contains nicotine"</i>
	Is the use of e-cigarettes the best choice in smoking cessation?	<p><i>"No, because it is at risk of drug abuse. The use of e-cigarettes must be able to control oneself so that efforts to stop smoking are successful"</i></p> <p><i>"I can, when I use vapor I can not smoke for 6 months but after I don't use vapor anymore, I will go back to smoking"</i></p>
	Is there a need for special regulations for e-cigarettes?	<p><i>"E-cigarette regulations must be clear, because there are many sales in online shops but no one is supervising them"</i></p> <p><i>"There needs to be a standard for e-cigarettes, to be able to protect the safety of the user community"</i></p> <p><i>"If the regulation is e-cigarettes are legalized, then pharmacists must play a role in providing them in a standard manner and providing special counseling"</i></p>
	Is smoking regulation in Indonesia correct?	<p><i>"I think it's still not enough, because the warning in the form of a picture of the condition when you are sick on cigarette packaging still can't reduce the desire of smokers to quit."</i></p> <p><i>"It is necessary to clarify the sanctions for smokers who smoke in public places"</i></p> <p><i>"The smoking cessation program in Indonesia is still not widely known by the public and health workers themselves"</i></p>
E-cigarette regulations and smoking cessation programs		

processing, is relatively well-preserved in later life as reflected in stable levels of crystallized ability [25]. Possible predictors of factors associated with smoking cessation included age, socioeconomic status, health conditions, and severity of nicotine dependence [26]. Comorbidities that the respondent has are dyspnea and hypertension (Tab. I). Gastroesophageal reflux disease (GERD), functional dyspepsia (FD), and irritable bowel syndrome (IBS) are common gastrointestinal diseases. Several studies have shown a significant occurrence of

overlap among these 3 diseases, and cigarette smoking was significantly associated with overlaps among GERD, FD, and IBS in Japanese adults [27]. Tobacco smoking is regarded as an aetiological factor of GERD, by reducing the lower oesophageal sphincter pressure, facilitating reflux. Tobacco smoking reduces the production of saliva rich in bicarbonate, which is important for buffering and clearance of acid in the oesophagus [28]. Based on in-depth interview data, there are 3 topics discussed, namely:

a. The dangers of e-cigarette for health.

*"I think smoking is harmful to health, but health factors are also influenced by genetics and heredity".*

*"Smoking is dangerous because it can cause chronic lung disease, lung cancer, or complications of heart disease. Especially when it comes to old age".*

Previous studies have identified variants in genes encoding proteins associated with the degree of addiction, smoking onset, and cessation. There were differences in the genotype frequencies of SNPs in genes related to nicotine metabolism and nicotine dependence. Slow metabolizers smoked more cigarettes per day than intermediate and normal metabolizers [29].

*"E-cigarettes tend to be safer for passive smokers than tobacco cigarettes, because e-cigarette smoke does not contain harmful substances".*

E-cigarette liquid was a solution that usually contains nicotine, glycerol, propylene glycol and various flavour additives. When thermally treated, it emits what was commonly referred to as a 'vapour', which is in fact a fine aerosol consisting of liquid and solid particles, dispersed in a gas. Following inhalation using the e-cigarette, the aerosol is delivered into the user's lungs, while during expiration the remaining aerosol is exhaled into the environment, forming an unintentional pollution source of particulate matter (second-hand aerosol or SHA) to which bystanders are potentially exposed. 30-minute passive exposure to e-cigarette emissions revealed immediate alterations in respiratory mechanics and exhaled biomarkers, expressed as increased fres and reduced FeNO [30].

b. The role of e-cigarettes in quitting smoking

*"Yes, because quitting smoking can use e-cigarettes by reducing nicotine levels gradually"*

*"Yes, of course because it contains nicotine".*

*"No, because it is at risk of drug abuse. The use of e-cigarettes must be able to control oneself so that efforts to stop smoking are successful".*

The benefits of e-cigarettes in smoking cessation show that previous studies by Malas et al. [31] showed that more people probably stop smoking for at least six months using nicotine e-cigarettes than using nicotine replacement therapy (3 studies, 1498 people), or nicotine-free e-cigarettes (4 studies, 1057 people). Nicotine e-cigarettes may help more people to stop smoking than no support or behavioral support only (5 studies, 2561 people). For every 100 people using nicotine e-cigarettes to stop smoking, 10 or 11 might successfully stop, compared with only six of 100 people using nicotine-replacement therapy or nicotine-free e-cigarettes, or four of 100 people having no support or behavioral support only [31]. Other research showed that as consumer products, in observational studies, e-cigarettes were not associated with increased smoking cessation in the adult population. In RCTs, provision of free e-cigarettes as a therapeutic intervention was associated with increased smoking cessation. E-cigarettes should not be approved as consumer products but may warrant consideration as a prescription therapy [32].

c. E-cigarette regulations and smoking cessation programs

*"E-cigarette regulations must be clear, because there are many sales in online shops but no one is supervising them".*

*"There needs to be a standard for e-cigarettes, to be able to protect the safety of the user community"*

*"If the regulation is e-cigarettes are legalized, then pharmacists must play a role in providing them in a standard manner and providing special counseling".*

*"The smoking cessation program in Indonesia is still not widely known by the public and health workers themselves".*

Discussions related to e-cigarettes have actually been going on since 2014. There are many obstacles, one of which is because e-cigarettes have not been included in health products. For (conventional) cigarettes, there are clearly rules in PP 109 [3], while at this time (e-cigarettes) only public goods are sold without permission from the Ministry of Health. E-cigarettes circulating in Indonesia are included in electronic goods. So there is no regulation whether it is prohibited or restricted. In Brunei Darussalam, Malaysia, Singapore and Vietnam, e-cigarettes are equated with tobacco cigarettes, so they use the existing regulations in terms of importation, sales, and so on. Meanwhile in Cambodia, there is a new regulation at the level of a Ministry Circular which regulates the import, sale, and places that are not allowed to consume e-cigarettes. Thailand chose to combine existing regulations and issue new regulations related to e-cigarettes. Indonesia itself is a country that is very slow in responding to e-cigarettes, as evidenced by the recently released regulations regarding e-cigarettes where the regulation only states that liquids sold on the market must include customs duties which will then be taxed at 57%. The existence of regulations regarding e-cigarettes in several Southeast Asian countries should be a consideration for the State of Indonesia in making regulations regarding e-cigarettes, especially those related to the health of their users [33].

Pharmacy as one of the health workers must play a role in the smoking cessation program. Skill-based training for pharmacists and pharmacy assistants, ongoing practical support, investment in electronic resources and the promotion of pharmacy-based smoking cessation to GPs were found to be crucial for the improvement of smoking cessation services provided by community pharmacists [34]. Community pharmacists could provide effective smoking cessation treatment because they offer easy access to members of the community. They were well placed to provide both advice on the correct use of smoking cessation products and behavioral support to aid smoking cessation. Community pharmacists can provide effective behavioral support to people trying to stop smoking. However, this conclusion was based on low-certainty evidence, limited by risk of bias and imprecision [35].

The sample size was pooled until the collected data reached saturation, and no additional data were found. Although the saturation parameter was still determinant,

how the saturation parameter found in previous methodological studies and the community norm sample size may best inform [36].

## Conclusions

The highest level of knowledge about dangers of e-cigarettes, especially related to nicotine (all respondents answered correctly). Meanwhile, all knowledge topics showed > 50% of respondents who answered correctly. The highest positive level of attitude about dangers of e-cigarettes, especially e-cigarettes harmful to passive smokers. Regulation of e-cigarettes in Indonesia was considered to be lacking and needs to be improved.

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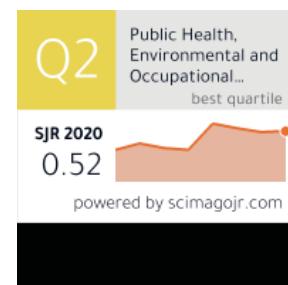
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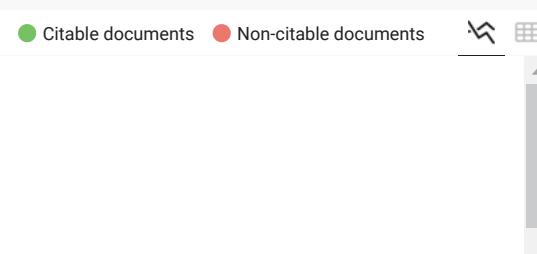
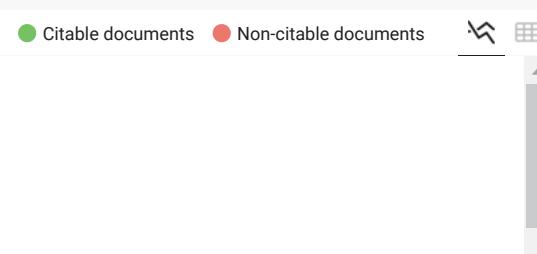
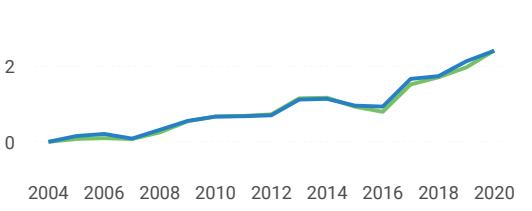
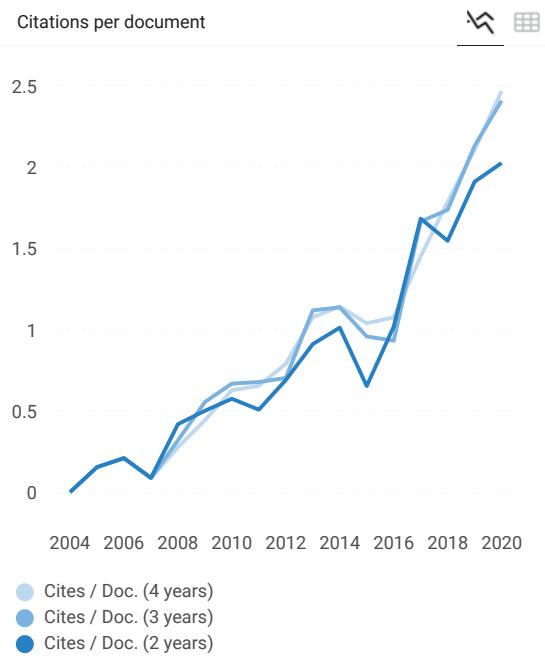
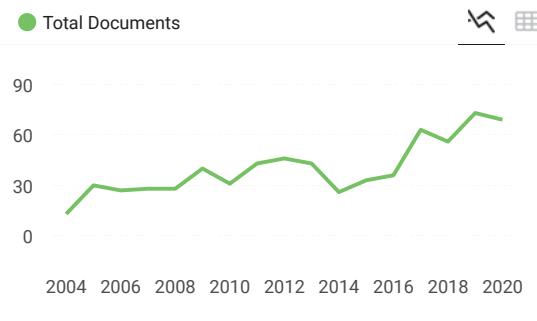
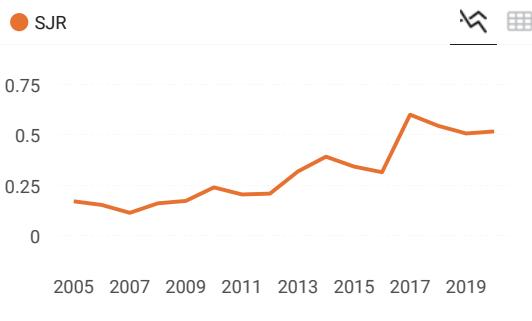
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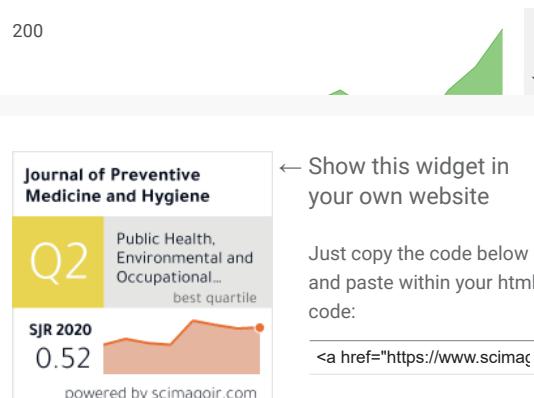
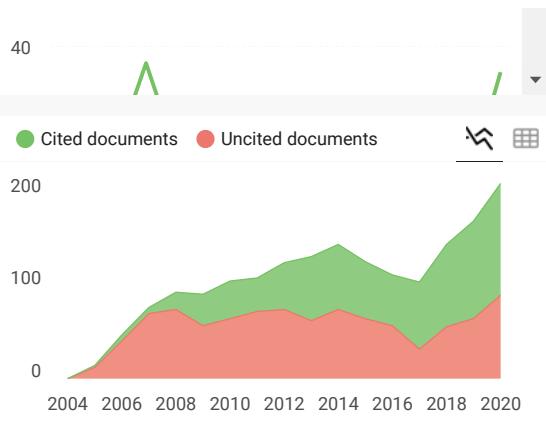
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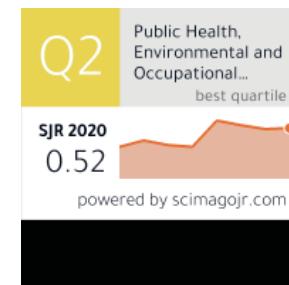
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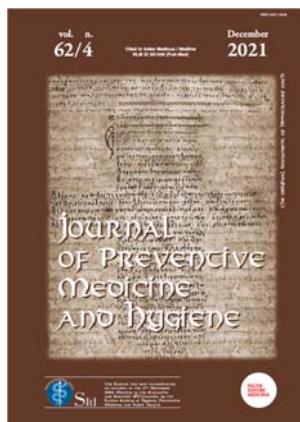
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# Knowledge and attitudes on smoking cessation of e- cigarettes: a mixed-methods study of pharmacy students in Surabaya, Indonesia

*by Amelia Lorensia*

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## HEALTH PROMOTION

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AMELIA LORENSIA<sup>1</sup>, ANGARA MARTHA PRATAMA<sup>2</sup>, RIZKI HERSENDIO<sup>3</sup><sup>1</sup> Department of Clinical-Community Pharmacy, Faculty of Pharmacy, Universitas Surabaya, Ubaya, Indonesia;<sup>2</sup> Faculty of Pharmacy, Sekolah Tinggi Ilmu Kesehatan Harapan Bangsa, Indonesia; <sup>3</sup> Bachelor Student of Faculty of Pharmacy,

Faculty of Pharmacy, Universitas Surabaya, Ubaya, Indonesia

## Keywords

Attitude • E-cigarettes • Knowledge • Pharmacist students • Smoking cessation

## Summary

**Background.** Pharmacy students as candidates for health workers who will take part in smoking cessation. Knowledge and attitude of smoking cessation can help map the behavior of pharmacists in the future. This study aimed to explore knowledge and attitudes on smoking cessation of e-cigarettes with the mixed methods study of pharmacist students.

**Method.** This research was conducted in Januari-Juni 2021 in Surabaya. The research design was mix-method with sequential explanatory strategy. The variables were knowledge and attitudes on smoking cessation of e-cigarettes. The sample in this qualitative approach was derived from a sample of quantitative data. Respondents were interviewed in depth until the data reached the saturation level in order to obtain good and usable qualitative data.

**Results.** This study involved 31 respondents. The highest level

of knowledge about dangers of e-cigarettes, especially related to nicotine (100% of respondents answered correctly). The highest positive level of attitude about dangers of e-cigarettes, especially e-cigarettes harmful to passive smokers (27% of respondents had positive attitude). Cigarettes were harmful to lung and cardiovascular health, regarding the dangers of passive smoking, some agree and disagree. Non-smokers didn't need to be recommended for e-cigarettes, e-cigarettes can be recommended for tobacco smokers, e-cigarettes cause addiction, and e-cigarettes can be a good recommendation for those who want to carry out smoking cessation. Regulation of e-cigarettes in Indonesia was considered to be lacking and needs to be improved.

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**Conclusions.** Pharmacist students have a high level of knowledge and a positive attitude towards smoking cessation.

## Introduction

Smoking is a public health threat in the world that causes death. Indonesia is the fifth largest producer of tobacco leaf and also the largest producer and exporter of cigarettes in the world. In fact, Indonesia is also the third largest cigarette consumer in the world [1]. Indonesia is one of the countries with the largest smoking prevalence in the world. In 2012 the prevalence percentage of male smokers, which was 67%, was much higher than female smokers, which was 2.7% [2]. The government has tried to limit the number of smokers, one of which is by restricting cigarette advertising in Government Regulation No. 109/2012 article 39 [3], but the number of smokers is still large. Several types of diseases that can be triggered by smoking include cardiovascular disease, chronic respiratory disease, digestive disorders, which can cause death [4-6].

The losses due to smoking in terms of health and economy make the smoking cessation program the main choice of treatment for smokers. Although many pharmaceutical products have been used to stop smoking, they are only able to make smokers stop temporarily [7, 8]. This is because the nicotine in cigarettes causes dependence. Nicotine stimulates acetylcholine receptors on dopamine-

containing neurons, thereby causing an increase in dopamine in the central brain reward system. Nicotine peaks, a temporary activation of the brain reward system, followed by a gradual decrease in nicotine levels, to a point of withdrawal that can only be relieved by smoking a cigarette. Nicotine causes a pleasant feeling that makes smokers addicted to continue smoking. When smokers try to reduce or try to quit smoking, it can cause symptoms of anxiety and restlessness. The longer the nicotine content in the body, the stronger the smoking behavior, so that smokers are increasingly difficult to leave cigarettes [9]. Research by Lorensia et al. [10], shows that quitting smoking is complex and not easy. All of the study respondents who failed to quit smoking had known the dangers of smoking, and had tried to quit smoking because smoking affects health and economic factors.

Now many smokers are switching to using e-cigarettes, which are increasing rapidly. E-cigarette users report buying e-cigarettes to help quit smoking, reduce cigarette consumption, and continue to want to 'smoking', but with a reduced risk of health hazards. Other surveys also show that many smokers try e-cigarettes for reasons that e-cigarettes can deliver nicotine into the bloodstream and reduce tobacco use [11-14]. In addition to providing

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<sup>12</sup> nicotine, e-cigarettes are believed to be able to change the habits of someone who is used to holding the cigarette to be smoked. E-cigarettes can help smokers to continue to consume cigarettes but without going through the burning process [15]. However, the use of e-cigarettes is still controversial.

However, there was not enough evidence to claim e-cigarettes can help a person to quit smoking and it was not recommended to recommend e-cigarettes because they can cause nicotine addiction problems and can increase the risk of chronic disease and other health problems. E-cigarette users have reason to use e-cigarettes as a smoking cessation therapy [12, 16]. In previous research on knowledge and attitudes as a predisposition to smoking behavior in the vapor community or e-cigarette users [17, 18]. There was a relationship between knowledge, attitudes, and perception of e-cigarette users [19-22]. In another study conducted by Aghar et al. [22], which was conducted on 3,652 respondents aged 18 to 24 years. The results showed that 63.3% of respondents had low or less knowledge of the use of e-cigarettes, but more than 50% of respondents had a positive attitude or supported the use of e-cigarettes. This study aimed to explore knowledge and attitudes on smoking cessation of e-cigarettes with the mixed methods study of pharmacist students. Pharmacists as one of the health workers play an important role in the smoking cessation program. University of Surabaya pharmacy students who are prospective pharmacists are required to carry out the role of pharmacy listed in the Good Pharmacy Practice guidelines which include four main activities, namely: promotive, preventive, curative and rehabilitative [23]. Activities that have been determined, promotive or preventive activities can be carried out in order to create vigilance for e-cigarette users [24].

## Method

### RESEARCH DESIGN

This study used mixed-method research method by combining two data, namely: quantitative data and qualitative data so as to produce a more comprehensive explanation. The design strategy was sequential explanatory strategy, so that quantitative data obtained in the form of the level of knowledge and attitudes of subjects who use e-cigarettes then the data was re-analyzed and used to obtain qualitative data with a sequential explanatory strategy design. Data collection was carried out from Januari-Juni 2021 in Surabaya, East Java, Indonesia, through filling out questionnaires. The ethics committee of the Stikes Harapan Bangsa approved the study protocols (No. 055/C/I/SHB/2021).

### RESEARCH VARIABLE

The variables were knowledge and attitudes on smoking cessation of e-cigarettes. Knowledge was divided into 2 groups, namely high (if the respondent answers the questionnaire with a correct value of > 60% of the

total knowledge questions) and low (if the respondent answers the questionnaire with a correct value of 60% of the total knowledge question). Attitudes were divided into 2 groups, namely positive and negative. The attitude level was good if the individual answers the attitude statement with a total score of more than 66.7% of the maximum score and the less attitude level when the individual answers the attitude statement with a total score of more than 66.7% of the maximum score.

### POPULATION AND SAMPLE RESEARCH

The population was male students at a private university in Rungkut sub-district, Surabaya. The criteria of this research subjects were: > 18 years old and no other respiratory or cardiovascular disease which can affect the measurement of lung function. The sampling method used was purposive and snowball sampling method. Respondents were recruited consecutively until data saturation. The respondents were encountered in several public places on campus where students commonly smoked. The smokers who were participants in this study were asked to introduce the authors to their friends/relatives who were then approached as participants.

### METHOD OF COLLECTING DATA IN STATISTICS AND DATA ANALYSIS METHOD

The questionnaires containing questions and statements aimed at determining the level of knowledge and attitudes towards the use of e-cigarettes. This instrument was designed from various research articles that have been traced and then validated and to determine whether an instrument is valid or not by looking at the  $r_{count}$  value. The value of  $r_{count}$  must be greater than the value of  $r_{table}$  so that the questionnaire was declared valid. The instrument reliability test was carried out by testing its reliability with SPSS 25 software using the Cronbach's method. The questionnaire was declared reliable if the Cronbach's alpha value was greater than 0.6.

The sample in this qualitative approach was derived from a sample of quantitative data that has been previously collected and each question point in the quantitative data was analyzed again. Respondents were interviewed in depth until the data reached the saturation level in order to obtain good and usable qualitative data. In collecting qualitative data this will be done by interviewing the respondents. The data from the interviews were analyzed in an early stage, namely transcribing the results of the coding interviews with the following coding stages: (1) Open coding by simplifying the results of interview transcripts with respondents. The results of the interviews were simplified according to the answers given by the respondents in order to represent the themes studied; (2) Axial coding which aims to organize various categories, link between these categories and find core categories; (3) Selective coding was the last stage, which was choosing the core category and connecting it with other categories to get the main theme in the research.

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## Result

The research had been done, 31 respondents had been successfully obtained to fill out the questionnaire and continued with in-depth interviews. The characteristics of respondents were age, medical history, and profile history of using e-cigarettes (Tab. I). Most of respondents were in the age of 20-21 years (15 of 31) and had no comorbidities (18 of 31) (Tab. I).

Table II described the history of smoking e-cigarettes from the respondents. Most respondents use e-cigarettes for < 1 year (18 of 31) and use it every day (23 of 31).

The biggest reason for using e-cigarettes was wanting to quit smoking or as a switch from tobacco cigarettes (26 of 31).

The level of knowledge of respondents about e-cigarettes related to smoking cessation can be seen in Table III. There were 5 topics observed, namely dangers of e-cigarettes, their effects on health, the flow of e-cigarettes with smoking cessation, smoking cessation programs, and their relation to regulation. The highest level of knowledge about dangers of e-cigarettes, especially related to nicotine (100% of respondents answered correctly). The lowest average score on the topic of the

Tab. I. Frequency distribution of characteristics.

Respondent characteristics		Frequency (n: 31)	Percentage (%)
Age (years)	18-19	14	45.16
	20-21	15	48.39
	22-23	2	6.45
Disease history	Dyspepsia	10	32.36
	Hipertensi	3	9.68
	Tidak ada penyakit penyerta	18	58.06

Tab. II. Frequency distribution of e-cigarette use history.

Frequency distribution of e-cigarette use history		Frequency (n: 31)	Percentage (%)
Long time using e-cigarettes	1 year	13	41.96
	< 1 year	18	58.06
Frequency of using e-cigarettes	Every day	23	74.19
	Often (> 3x a week)	5	16.13
33 Reasons for using e-cigarettes	Sometimes (1-3x a week)	3	9.68
	Want to quit smoking (previously/currently using cigarettes)	26	83.87
For those who want to quit smoking with e-cigarettes (n: 26). The desire to do smoking cessation before	Just want to try	5	16.13
	Ever	28	90.32
	<b>Economic factor</b>	8	<b>25.81</b>
	<b>Health factor</b>	13	<b>41.94</b>
	<b>Environmental factor</b>	5	<b>16.13</b>
	<b>Self factor</b>	2	<b>6.45</b>
Reasons for failure to quit smoking that have been done before	Never	3	9.68
	Discomfort in the mouth	12	38.71
	Restlessness and headache	10	32.26
	The feeling of wanting to smoke again due to environmental factors	6	19.35
Reasons for smoking using e-cigarettes	Never tried to quit smoking	3	9.68
	Nicotine reduction can be self-regulated	20	64.52
	Cheaper than tobacco cigarettes	6	19.35
	Does not cause bad breath	4	12.90
The benefits that have been obtained in the use of e-cigarettes on the frequency of smoking	Does not cause smoke	1	3.23
	Quit smoking tobacco	5	16.13
	Frequency is decreasing	16	51.61
	Permanent	7	22.58
Benefits of using e-cigarettes on health	The frequency of smoking actually increases	3	9.68
	Breath feels easier	11	35.48
	Weight begins to increase/appetite increases	8	25.81
	Reduced bad breath	5	16.13
	Permanent	7	22.58

**Tab. III.** Knowledge of e-cigarette smoker related to smoking cessation.

Knowledge of e-cigarette smoker related to smoking cessation	Respondents who answered correctly	
	Frequency	Percentage (%)
Knowledge about the dangers of e-cigarettes	Nicotine content	31 100
	Propylene glycol content	28 90.32
	Flavoring content	25 80.65
The dangers of e-cigarettes for health	Dangers for lung and cardiovascular function	27 87.10
	Relationship with nutritional intake due to decreased appetite	23 74.19
	The risk of drug abuse	24 77.42
The role of e-cigarettes in smoking cessation	Use of e-cigarettes with gradual reduction in nicotine (reduces addiction)	30 96.77
	The use of e-cigarettes in reducing the risk of disease	27 87.10
	The difference between e-cigarettes and tobacco cigarettes is related to health	17 54.84
Smoking cessation program	Relation to medicine	30 96.77
	Relation to physical activity	17 54.84
	Relation to healthy diet	17 54.84
	Relation to comorbidities	29 93.55
E-cigarette regulations and smoking cessation programs	E-cigarette regulations in Indonesia	17 54.84
	Regulation of smoking cessation program in Indonesia	19 61.29

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role of e-cigarettes related to smoking cessation, which is related to the difference between e-cigarettes and tobacco cigarettes (54.84% of respondents answered correctly); and smoking cessation program in relation to physical activity (54.84% of respondents answered correctly) and relation to a healthy diet (54.84% of respondents answered correctly); and regulation of e-cigarettes in Indonesia (54.84% of respondents answered correctly) (Tab. III).

The level of attitude of respondents about e-cigarettes related to smoking cessation can be seen in Table IV. There were 3 topics observed, namely the dangers of e-cigarettes, role e-cigarettes in smoking cessation, and their relation to regulation. The highest positive level of attitude topic about dangers of e-cigarettes, especially e-cigarettes harmful to passive smokers and used of e-cigarettes the best choice in smoking cessation (27 of 30 respondents had positive attitude). The lowest average score on regulation of e-cigarettes in Indonesia (5 of

respondents had positive attitude) (Tab. IV). Table V showed the results of the classification of knowledge and attitudes of e-cigarette smokers related to smoking cessation, indicating that most respondents had high level of knowledge (921 of 31) and most respondents also had positive attitude level (18 of 31). The results of in-depth interviews with several snippets of respondents' answers can be seen in Table VI.

## Discussion

Most respondents were between 20-21 years old (Tab. I), which was young age. Age can affect a person's knowledge and attitudes. Aging is associated with two areas of change that may increase the importance of knowledge in later life. First, aging is associated with declines in efficiency of cognitive processes. Second, knowledge, representing the long-term products of

**Tab. IV.** Attitude of e-cigarette smoker related to smoking cessation.

Attitude of e-cigarette Smoker related to Smoking Cessation	Respondent's answer (n: 31)	
	Positive	Negative
The dangers of e-cigarettes for health	Are e-cigarettes harmful to lung and cardiovascular health?	21 10
	Are e-cigarettes harmful to passive smokers?	27 4
The role of e-cigarettes in smoking cessation	Should e-cigarettes be recommended to non-smokers?	6 25
	Should e-cigarettes be recommended for tobacco smokers?	11 20
	Do e-cigarettes cause dependence/addiction?	17 14
	Is the use of e-cigarettes the best choice in smoking cessation?	27 4
E-cigarette regulations and smoking cessation programs	Is there a need for special regulations for e-cigarettes?	5 26
	Is smoking regulation in Indonesia correct?	13 18

Tab. V. Classification of knowledge and attitude of e-cigarette smoker related to smoking cessation.

	Classification	Frequency (n: 31)	Percentage (%)
Knowledge	High	21	67.74
	Low	10	32.26
Attitude	Positive	18	58.06
	Negative	13	41.93

Tab. VI. In-depth interview findings.

Topics	Question	Quote respondents answer
The dangers of e-cigarettes for health	Are e-cigarettes harmful to lung and cardiovascular health?	<p><i>"I think smoking is harmful to health, but health factors are also influenced by genetics and heredity"</i></p> <p><i>"Smoking is dangerous because it can cause chronic lung disease, lung cancer, or complications of heart disease. Especially when it comes to old age"</i></p> <p><i>"I don't think it's dangerous, because nicotine levels are low"</i></p>
	Are e-cigarettes harmful to passive smokers?	<p><i>"E-cigarettes tend to be safer for passive smokers than tobacco cigarettes, because e-cigarette smoke does not contain harmful substances"</i></p> <p><i>"Probably not dangerous, because it doesn't burn tobacco like tobacco cigarettes"</i></p>
	Should e-cigarettes be recommended to non-smokers?	<i>"no need, because it can cause addiction due to nicotine"</i>
	Should e-cigarettes be recommended for tobacco smokers?	<p><i>"Yes, because quitting smoking can use e-cigarettes by reducing nicotine levels gradually"</i></p> <p><i>"No, because in Indonesia, e-cigarettes have not officially become part of the smoking cessation program"</i></p>
The role of e-cigarettes in smoking cessation	Do e-cigarettes cause dependence/addiction?	<i>"Yes, of course because it contains nicotine"</i>
	Is the use of e-cigarettes the best choice in smoking cessation?	<p><i>"No, because it is at risk of drug abuse. The use of e-cigarettes must be able to control oneself so that efforts to stop smoking are successful"</i></p> <p><i>"I can, when I use vapor I can not smoke for 6 months but after I don't use vapor anymore, I will go back to smoking"</i></p>
	Is there a need for special regulations for e-cigarettes?	<p><i>"E-cigarette regulations must be clear, because there are many sales in online shops but no one is supervising them"</i></p> <p><i>"There needs to be a standard for e-cigarettes, to be able to protect the safety of the user community"</i></p> <p><i>"If the regulation is e-cigarettes are legalized, then pharmacists must play a role in providing them in a standard manner and providing special counseling"</i></p>
	Is smoking regulation in Indonesia correct?	<p><i>"I think it's still not enough, because the warning in the form of a picture of the condition when you are sick on cigarette packaging still can't reduce the desire of smokers to quit."</i></p> <p><i>"It is necessary to clarify the sanctions for smokers who smoke in public places"</i></p> <p><i>"The smoking cessation program in Indonesia is still not widely known by the public and health workers themselves"</i></p>
E-cigarette regulations and smoking cessation programs		

5 processing, is relatively well-preserved in later life as reflected in stable levels of crystallized ability [25]. Possible predictors of factors associated with smoking cessation included age, socioeconomic status, health conditions, and severity of nicotine dependence [26]. Comorbidities that the respondent has are dyspnea and hypertension (Tab. I). Gastroesophageal reflux disease (GERD), functional dyspepsia (FD), and irritable bowel syndrome (IBS) are common gastrointestinal diseases. Several studies have shown a significant occurrence of

14 overlap among these 3 diseases, and cigarette smoking was significantly associated with overlaps among GERD, FD, and IBS in Japanese adults [27]. Tobacco smoking is regarded as an aetiological factor of GERD, by reducing the lower oesophageal sphincter pressure, facilitating reflux. Tobacco smoking reduces the production of saliva rich in bicarbonate, which is important for buffering and clearance of acid in the oesophagus [28]. Based on in-depth interview data, there are 3 topics discussed, namely:

a. The dangers of e-cigarette for health.

*"I think smoking is harmful to health, but health factors are also influenced by genetics and heredity".*

*"Smoking is dangerous because it can cause chronic lung disease, lung cancer, or complications of heart disease. Especially when it comes to old age".*

Previous studies have identified variants in genes encoding proteins associated with the degree of addiction, smoking onset, and cessation. There were differences in the genotype frequencies of SNPs in genes related to nicotine metabolism and nicotine dependence. Slow metabolizers smoked more cigarettes per day than intermediate and normal metabolizers [29].

*"E-cigarettes tend to be safer for passive smokers than tobacco cigarettes, because e-cigarette smoke does not contain harmful substances".*

E-cigarette liquid was a solution that usually contains nicotine, glycerol, propylene glycol and various flavour additives. When thermally treated, it emits what was commonly referred to as a 'vapour', which is in fact a fine aerosol consisting of liquid and solid particles, dispersed in a gas. Following inhalation using the e-cigarette, the aerosol is delivered into the user's lungs, while during expiration the remaining aerosol is exhaled into the environment, forming an unintentional pollution source of particulate matter (second-hand aerosol or SHA) to which bystanders are potentially exposed. 30-minute passive exposure to e-cigarette emissions revealed immediate alterations in respiratory mechanics and exhaled biomarkers, expressed as increased  $\text{FeNO}$  and reduced  $\text{FeNO}$  [30].

b. The role of e-cigarettes in quitting smoking

*"Yes, because quitting smoking can use e-cigarettes by reducing nicotine levels gradually"*

*"Yes, of course because it contains nicotine".*

*"No, because it is at risk of drug abuse. The use of e-cigarettes must be able to control oneself so that efforts to stop smoking are successful".*

The benefits of e-cigarettes in smoking cessation show that previous studies by Malas et al. [31] showed that more people probably stop smoking for at least six months using nicotine e-cigarettes than using nicotine replacement therapy (3 studies, 1498 people), or nicotine-free e-cigarettes (4 studies, 1057 people). Nicotine e-cigarettes may help more people to stop smoking than no support or behavioral support only (5 studies, 2561 people). For every 100 people using nicotine e-cigarettes to stop smoking, 10 or 11 might successfully stop, compared with only six of 100 people using nicotine-replacement therapy or nicotine-free e-cigarettes, or four of 100 people having no support or behavioral support only [31]. Other research showed that as consumer products, in observational studies, e-cigarettes were not associated with increased smoking cessation in the adult population. In RCTs, provision of free e-cigarettes as a therapeutic intervention was associated with increased smoking cessation. E-cigarettes should not be approved as consumer products but may warrant consideration as a prescription therapy [32].

c. E-cigarette regulations and smoking cessation programs

*"E-cigarette regulations must be clear, because there are many sales in online shops but no one is supervising them".*

*"There needs to be a standard for e-cigarettes, to be able to protect the safety of the user community"*

*"If the regulation is e-cigarettes are legalized, then pharmacists must play a role in providing them in a standard manner and providing special counseling".*

*"The smoking cessation program in Indonesia is still not widely known by the public and health workers themselves".*

Discussions related to e-cigarettes have actually been going on since 2014. There are many obstacles, one of which is because e-cigarettes have not been included in health products. For (conventional) cigarettes, there are clearly rules in PP 109 [3], while at this time (e-cigarettes) only public goods are sold without permission from the Ministry of Health. E-cigarettes circulating in Indonesia are included in electronic goods. So there is no regulation whether it is prohibited or restricted. In Brunei Darussalam, Malaysia, Singapore and Vietnam, e-cigarettes are equated with tobacco cigarettes, so they use the existing regulations in terms of importation, sales, and so on. Meanwhile in Cambodia, there is a new regulation at the level of a Ministry Circular which regulates the import, sale, and places that are not allowed to consume e-cigarettes. Thailand chose to combine existing regulations and issue new regulations related to e-cigarettes. Indonesia itself is a country that is very slow in responding to e-cigarettes, as evidenced by the recently released regulations regarding e-cigarettes where the regulation only states that liquids sold on the market must include customs duties which will then be taxed at 57%. The existence of regulations regarding e-cigarettes in several Southeast Asian countries should be a consideration for the State of Indonesia in making regulations regarding e-cigarettes, especially those related to the health of their users [33].

Pharmacy as one of the health workers must play a role in the smoking cessation program. Skill-based training for pharmacists and pharmacy assistants, ongoing practical support, investment in electronic resources and the promotion of pharmacy-based smoking cessation to GPs were found to be crucial for the improvement of smoking cessation services provided by community pharmacists [34]. Community pharmacists could provide effective smoking cessation treatment because they offer easy access to members of the community. They were well placed to provide both advice on the correct use of smoking cessation products and behavioral support to aid smoking cessation. Community pharmacists can provide effective behavioral support to people trying to stop smoking. However, this conclusion was based on low-certainty evidence, limited by risk of bias and imprecision [35].

The sample size was pooled until the collected data reached saturation, and no additional data were found. Although the saturation parameter was still determinant,

how the saturation parameter found in previous methodological studies and the community norm sample size may best inform [36].

## Conclusions

The highest level of knowledge about dangers of e-cigarettes, especially related to nicotine (all respondents answered correctly). Meanwhile, all knowledge topics showed > 50% of respondents who answered correctly. The highest positive level of attitude about dangers of e-cigarettes, especially e-cigarettes harmful to passive smokers. Regulation of e-cigarettes in Indonesia was considered to be lacking and needs to be improved.

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