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Factors affecting the use of electronic cigarettes in Udayana University students

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ABSTRACT

Background and purpose: Electronic cigarettes (e-cigarettes) have been marketable since 2003 and first became for sale in Indonesia in 2010. Users tend to be predominately young people. The purpose of this study is to determine the proportion, characteristics and factors that influence the use of e-cigarettes among university students.

Methods: This study used a cross sectional survey with 351 undergraduate students from a variety of study programs at Udayana University. Students were selected by multistage random sampling. In the first step, 10 out of 47 study programs at Udayana University were chosen randomly. Students who responded by filling out online questionnaires were included in this study. Data collection was conducted using questionnaires with the Survey Monkey Application. Analysis with logistic regression was applied to determine the factors influencing e-cigarettes use.

Results: The proportion of university students who used tobacco cigarettes was 14.53%. The number of respondents who reported had ever used e-cigarettes was 61 (17.38%, 95%CI: 13.46%-21.3%) and 25 of them (40.98%) were current smokers. As many as 88.52% of respondents who had ever used e-cigarettes were male and 11.48% were female. Students who had ever used e-cigarettes in the campus area were 22 (36.07%). The reasons of using e-cigarettes included a desire to stop using tobacco cigarettes (29.51%), the fact that e-cigarettes are considered safer (26.23%), are considered "cool" (22.95%) and other reasons (26.23%). Multivariate analysis showed that the variables found to be associated with the use of e-cigarettes were gender (AOR=14.72; 95%CI: 4.34-49.87), a history of smoking tobacco cigarettes (AOR=42.16; 95%CI: 13.56-131.08), a history of consuming alcoholic beverages (AOR=5.72; 95%CI: 2.04-16.04) and coming from a smoking household (AOR=3.87; 95%CI: 1.33-11.21).

Conclusion: The proportion of university students who had ever used e-cigarettes was found to be higher than tobacco cigarettes users. In addition, use was found to be greater among male students than females. Influencing factors associated with the use of e-cigarettes are gender, a history of tobacco smoking, a history of consuming alcoholic beverages and coming from a smoking household. There is a need for prevention efforts including education and regulations to reduce the use of e-cigarettes among students as well as community in general.

Keywords: electronic smoking behaviors, tobacco, university students, Indonesia

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INTRODUCTION

Electronic cigarettes (e-cigarettes) were first discovered in 1963 by Herbert A. Gilbert.[1] In 2003 e-cigarettes were produced in more marketable way by a Chinese inventor named Hon Lik.[2] In 2006-2007 e-cigarettes were introduced in America and Europe.[2] The popularity of e-cigarettes continues to increase due to the availability of variations in device technology, size, color, flavor, battery capacity and others.[3] The World Health Organization (WHO) reported that in 2014 there were 466 varieties of e-cigarettes brands.[4] Consumption of e-cigarettes is reported to be on the increase in Britain and reported to be as many as 700,000 people in 2012, 1,300,000 in 2013, 2.1 million in 2014 and 2.6 million in 2015.[5]

E-cigarettes were introduced to Indonesia in 2010 and after that the sales of e-cigarettes in Indonesia tended to increase, especially online.[6] Studies on the use of e-cigarettes have not been widely conducted in Indonesia nor in other countries. This study aims to identify the proportion and factors determining of e-cigarettes usage among Udayana University students, Denpasar, Bali.

METHODS

A cross sectional survey was conducted using an online questionnaire through the *Survey Monkey* Application. The number of samples was calculated based on a confidence level of 95%, power of 80%, proportion of e-cigarettes smokers living with parents or partner who smoke of 25% and proportion of e-cigarettes smokers who not living with parents or partner who smoke of 16%.[7]

Students were selected by multistage random sampling. In the first step 47 study programs in Udayana University were divided into two groups: 26 science and technology and 21 social science and humanities. From each group, 5 study programs were selected randomly. The selected study programs are presented in Table 1. The number of students who responded by filling out online questionnaire was 351.

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Data collected via the questionnaire link which was shared through the student executive board of each study program. In order to increase the number of students who willing to participate in the study, it was announced through broadcast with compensation provided randomly for 40 students in the form of phone credit amounting to IDR 25,000. Data collected included date of birth, gender, domicile, origin, division, cluster, history and access of e-cigarettes, knowledge, history of using tobacco cigarettes, history of consuming alcoholic beverages, living at home with parents, influenced by peers who smoke, and the amount of allowance given by parents every month.

Data were analysed using STATA SE 12.1. Multivariate data analysis was applied using logistic regression to find out factors associated with the use of e-cigarettes. This study has been approved by the Ethics Committee of Faculty of Medicine, Udayana University/Sanglah General Hospital in Denpasar on July 14, 2017.

Table 1 Number of respondents and response rate by study program

Study program	n (%)	Number of students	Response rate (%)
Public Health	66 (18.8)	313	21.1
English Language	20 (5.7)	934	2.1
Veterinary Science	29 (8.3)	531	5.5
Law	53 (15.1)	2,294	2.3
Management	32 (9.1)	1,391	2.3
State Administration	38 (10.8)	43	88.4
Accountancy	30 (8.6)	1,349	2.2
Engineering	43 (12.3)	559	7.7
Pharmacy	33 (9.4)	284	11.6
Physiotherapy	7 (2.0)	50	14.0
Total	351 (100.0)	7,748	4.53

Table 2 Characteristics of respondents using e-cigarettes, smoking history and reasons for using e-cigarettes

Variables	n (%)
History of tobacco use	
Ever used	51 (14.53)
Never	300 (85.47)
History of e-cigarettes use	
Ever used	61 (17.38)
Never	290 (82.62)
Still using e-cigarettes	
Yes	25 (40.98)
No	36 (59.02)
Gender	
Male	54 (88.52)
Female	7 (11.48)
Use of e-cigarettes on campus	
Yes	22 (36.07)
No	39 (63.93)
Reason for using e-cigarettes*)	
Deemed safer	16 (26.23)
Cheaper	1 (1.64)
Easier to use	4 (6.56)
Assist with quitting tobacco	18 (29.51)
Influenced by friends	7 (11.47)
Deemed prestigious	14 (22.95)
Other (fun, curiosity, experiment etc)	16 (26.23)

*) Respondents may choose more than one option

RESULTS

Table 1 presents the number of respondents, the number of students in each study program and the response rate. There were 351 students who completed the questionnaire with the overall response rate of 4.53%. The highest response rate was the State Administration Study Program (88.4%) while the lowest response rate is found in the English Language Study Program (2.1%). There were more female respondents (64.10%) than males (35.90%). A total of 37.61% of respondents were aged between 17-19 years and 62.39% were aged between 20-24 years.

Table 2 presents data on the history of tobacco and e-cigarettes use. The proportion of students who used tobacco cigarettes was 14.53%. Respondents who had ever used e-cigarettes were 61 students (17.38%, 95%CI: 13.46%-21.3%) and 25 of them (40.98%) were current smokers. As many as 88.52% of respondents who had ever used e-cigarettes were male and 11.48% were female. Students who had ever used e-cigarettes on campus area were 22 (36.07%). The reasons of using e-cigarettes included a desire to stop using tobacco cigarettes (29.51%), the fact that e-cigarettes are considered safer (26.23%), are considered "cool" (22.95%) and other reasons such as fun, curiosity and to experiment (26.23%).

Table 3 shows bivariate analysis between the history of e-cigarettes usage with several variables. It appears that the proportion of respondents who had ever used e-cigarettes is significantly higher among male students ($p<0.01$), in the group of students with less knowledge of the dangers of electronic/tobacco cigarettes ($p<0.01$), a history of using tobacco cigarettes ($p<0.01$), had consumed alcoholic beverages ($p<0.01$) and had peers who smoke ($p<0.01$).

Table 3 Difference in proportion of e-cigarettes users based on several variables

Variable	E-cigarettes use		p
	Ever used	Never	
Gender			
Male	54 (42.86)	72 (57.14)	<0.01
Female	7 (3.11)	218 (96.89)	
Knowledge			
Poor	30 (27.27)	80 (72.73)	<0.01
Good	31 (12.86)	210 (87.14)	
Study program			
Social Sciences	22 (13.33)	143 (86.67)	0.06
Technical Sciences	39 (20.97)	147 (79.03)	
Smoking tobacco			
Yes	44 (86.27)	7 (13.73)	<0.01
No	17 (5.67)	283 (94.33)	
Alcohol consumption			
Yes	43 (47.78)	47 (52.22)	<0.01
No	18 (6.90)	243 (93.10)	
Lived with parents			
Yes	33 (15.57)	179 (84.43)	0.27
No	28 (20.14)	111 (79.86)	
Lived with smokers			
Yes	34 (20.24)	134 (79.76)	0.18
No	27 (14.75)	156 (85.25)	
Had peers who smoke			
Yes	60 (21.28)	222 (78.72)	<0.01
No	1 (1.45)	68 (98.55)	
Allowance (IDR)			
>600,000	36 (21.43)	132 (78.57)	0.06
≤600,000	25 (13.66)	158 (86.34)	
Ease of e-cigarrette access			
Yes	59 (17.35)	281 (82.65)	0.94
No	2 (18.18)	9 (81.82)	
Total	61 (17.38)	290 (82.62)	

Table 4 Adjusted odd ratio of factors that associated with the use of e-cigarettes

Variables	AOR	95%CI	p
Gender			
Female	1.00		
Male	14.72	4.34–49.87	<0.01
Knowledge of risks			
Good	1.00		
Poor	1.35	0.49–3.72	0.56
Study program			
Technical Science	1.00		
Social Science	0.57	0.19–1.66	0.30

Table 4 *Continue*

Variables	AOR	95%CI	p
History of tobacco use			
No	1.00		
Yes	42.16	13.56–13.08	<0.01
History of alcohol use			
No	1.00		
Yes	5.72	2.04–16.04	0.01
Had family members that smoke			
No	1.00		
Yes	3.87	1.33–11.21	0.01
Had peers that smoke			
No	1.00		
Yes	3.54	0.33–37.68	0.29
Allowance (IDR)			
≤600,000	1.00		
>600,000	2.02	0.74–5.48	0.17

Table 4 presents the results of multivariate analysis with logistic regression to determine the relationship between the use of e-cigarettes with several variables. In this analysis, the variables with p≤0.25 in the bivariate analysis were applied. It appears that the variables significantly associated with the use of e-cigarettes were gender (AOR=14.72; 95%CI: 4.34-49.87), a smoking history with tobacco cigarettes (AOR=42.16; 95%CI: 13.56-131.08), a history of consuming alcoholic beverages (AOR=5.72; 95%CI: 2.04-16.04) and coming from a smoking household (AOR=3.87; 95%CI: 1.33-11.21).

DISCUSSION

The proportion of students who had ever used e-cigarettes was 17.38% (95%CI: 13.46%-21.3%) and 25 of them (40.98%) were current smokers. In this study, the proportion of male students who reported ever smoking was much higher than female students, which were 42.86% and 3.11% respectively. The proportion of students who use e-cigarettes is probably greater than our findings because the proportion of female respondents was twice that of male respondents, which were 64.1% and 35.9% respectively, while the proportion of smokers was higher among male students. This study indicates that as many as 14.53% of students aged between 17-24 years reported had ever smoked tobacco. The proportion of the use of tobacco cigarettes in students was also dominated by male students compared to female students, namely 34.13% and 3.56%. When compared to the 2013 Indonesia Basic Health Research (*Riskesdas*) in Bali Province[7] where it was documented that the proportion of 15-19 year-olds who smoked tobacco every day was 8.2% and the age of 20-24 years was 21.8%, the proportion of students who had smoked tobacco was probably about the same as smokers of tobacco in the population of Bali Province aged between 15-24 years. The proportion of 17-24 year old male students who had ever smoked electronics (42.86%) was found to be higher than the proportion of male population of all ages in Bali Province who were currently smoking tobacco at the time of the *Riskesdas*.[8]

The proportion of e-cigarettes smokers at Udayana University is found to be similar to findings from a survey conducted in Poland during 2010-2011, wherein among 13,787 15-24 year olds, those that reported who ever smoking e-cigarettes accounted for 20.9% (95%CI: 20.1-21.6) and those that were habitual electronics smokers was reported at 6.9% (95%CI: 6.4-7.4).[7] However, the number of female smoking e-cigarettes reported in the study was much higher at 18.8%, compared to survey results from Udayana University.

The main reason of students to use e-cigarettes was a motivation to quit smoking tobacco. Other reasons were the assumption that e-cigarettes are safer, for fun, curiosity and experimental reasons. Similar reasons were reported in a study of college students in France, for example, a motivation to stop using tobacco cigarettes, the better taste of e-cigarettes in comparison with tobacco cigarettes, in order to reduce tobacco cigarette use, to experiment, the cheaper price, in order to avoid

the risk of tobacco for health and in order to avoid using tobacco cigarettes.[9]

Multivariate analysis indicated that factors related to ever using e-cigarettes were gender, history of using tobacco cigarettes, history of consuming alcoholic beverages as well as coming from a smoking household.

The limitations of our study were the high proportion of female respondents and the survey conducted only among university students. Further study is needed with more representative samples including surveys among the general population.

CONCLUSION

The proportion of Udayana University students who had ever used e-cigarettes is quite high and the proportion is higher than tobacco smokers. The use was discovered not only among male students but also among female students. Factors associated with the use of e-cigarettes were gender, a history of tobacco smoking, a history of consuming alcoholic beverages and coming from a smoking household. Considering the health and social impacts of e-cigarettes use, prevention measures, both education and regulatory, need to be implemented not only in the campus contexts but also among the general population.

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