Knowledge and attitude related to use of electronic cigarettes among undergraduate nursing students in an urban university setting in Philippines

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Summary

Background. *Electronic cigarette (e-cigarette) use has risen dramatically since its introduction in 2004. Nurses play a critical role in screening, disease prevention and smoking cessation for their patient. Their knowledge and attitude related to e-cigarettes will play a major part in development of tobacco control activities.*
Aim. *Thus, this study was conducted to determine the knowledge and attitude toward e-cigarettes among undergraduate nursing students in the Philippines.*
Methods. *The participants of the study were 122 level four nursing students of West Visayas State University, Iloilo city, Philippines. A standardized self-administered questionnaire was used to collect the data and statistical analyses were performed.*

Results. *Majority of the participants were female, were never smokers and were aware or conscious of the existence of the e-cigarettes but had poor knowledge on e-cigarettes. Furthermore, in terms of attitude the students as an entire group had a positive attitude opposing e-cigarette use. Never and former smokers had positive attitude opposing e-cigarette use while current smokers had negative attitude supporting e-cigarette use. There was no significant relationship between knowledge and attitude of nursing students towards e-cigarettes.*
Conclusion. *Nursing students did not have adequate knowledge regarding e-cigarettes but maintained a positive attitude opposing e-cigarette use. Poor knowledge did not influence the attitude of participants towards e-cigarettes.*

Introduction

Electronic cigarette (e-cigarette) is a battery-powered device that resembles tobacco cigarette and delivers nicotine that is vaporized electronically to simulate tobacco smoke [1]. E-cigarettes have been made available commercially as a "healthier" substitute to tobacco and its use has become progressively common, predominantly among the youth [2-4]. Past 30-day e-cigarette use prevalence increased from 1.5% in 2011 to 20.8% in 2018 in United States (US) high school students [5]. A similar rise in e-cigarette use have been reported amongst adolescents in Poland, Korea, Canada, and Hong Kong [6-9].

Despite the fact that e-cigarettes are a worldwide phenomenon, there is a paucity of data regarding the knowledge and attitude of e-cigarette users particularly among the youth in the Philippines. Since its introduction in 2004, e-cigarettes have been marketed as an alternative to nicotine delivery as well as been advertised as a suitable means for smoking cessation worldwide [10]. These claims made by e-cigarette advertisers, have sparked an international debate as clinical and laboratory studies to determine the long and short-term potential harmful health effects on e-cigarette users remain insufficient and inconclusive [11]. The data on use of e-cigarette and its potential harmful

effects is equivocal. The Royal College of Physicians suggests that e-cigarettes represent a "viable harm-reduction option" with respect to tobacco smoking and that "the hazard to health arising from long-term vapour inhalation from e-cigarettes available today is unlikely to exceed 5% of the harm from smoking tobacco" [12]. In contrast, the European Respiratory Society (ERS) stated that there is no evidence that e-cigarettes would be safer than tobacco in the long term [13]. However, ERS did acknowledge that e-cigarette aerosol contained potentially less toxic chemicals and in fewer concentration when compared to conventional cigarette.

Nurses play a critical role in screening, disease prevention and smoking cessation for their patients. They have the potential to influence patient behaviour as well as promote healthy lifestyle. Nursing students' knowledge and attitude towards e-cigarettes are of utmost importance because it has been demonstrated that healthcare providers who themselves smoke are less likely to assess and counsel their patients about smoking cessation [14]. Healthcare providers as a group have amongst the lowest rates of smoking with smoking rates having declined among physicians and registered nurses in the last two decades [15]. An international review of tobacco smoking among nurses revealed an overall pattern of smoking reduction since the 1970's with

higher rates in some developing countries. However, Asian countries generally had lower rates for tobacco smoking for female nurses who culturally are less inclined to smoke [16].

Nevertheless, as the use of e-cigarettes increases dramatically, nurses will have to adapt their counselling skills to address these changes. Moreover, understanding the nursing students' knowledge and attitude towards e-cigarettes would be valuable for development of tobacco control activities. Furthermore, there is a dearth of data on the knowledge and attitudes of nursing student towards e-cigarettes in Asian countries, particularly Philippines [4]. Thus, the objective of this study was to determine the knowledge and attitude of nursing students towards e-cigarettes and to assess the relationship between these two variables.

Methods

The investigation was conducted among level 4 nursing students of the Western Visayas State University (WYSU), Iloilo city, Philippines using a descriptive correlation design. The total number of students in the level 4 nursing for the academic year 2017-2018 was 175 as ascertained by the Registrar's office of WVSU. The sample size of the study was determined using the Slovin's formula (1960): $n = N/ (1 + Ne^2)$; where n = number of samples, N = total population admitted in level 4 in the University and e = error tolerance [17]. The margin of error was set at 0.05 which provided a confidence interval of 95% and the minimum sample size was calculated to be 102. The simple random sampling technique was employed to determine the participants of the study. Participants not available on the day of data collection were replaced with other participants from the total population.

A standardized self-administered 25-point questionnaire was used to gather data and consisted of four sections. The standardized research instrument was adapted from University of Philippines Manila Public Health [18] and several valid and reliable measures were accommodated from international tobacco research studies including National Youth Tobacco Survey [19] and Global Health Professional Surveyv[20]. Section one of the questionnaire recorded personal data and information regarding the participant's name, sex, smoking status, socioeconomic status based on STFAP (Socialized Tuition Fee Assistance Program) Bracketing. STFAP program is a program where brackets are assigned to students based on their annual family income (Tab. I) [18]. Section two recorded the awareness status of participants on e-cigarettes and consisted of only two items. Item 1 recorded the participants' awareness of e-cigarettes whilst item 2 determined how the participant had learned about e-cigarettes. If the response of the participants was yes, then they were categorized as "aware" or otherwise "unaware".

Part three determined the knowledge of participants and consisted of 10 items that measured the knowledge

Tab. I. Socialized Tuition Fee Assistance Program bracketing according to annual income.

Bracket	Income (in Philippine Peso)
Bracket 1	25,000 and below
Bracket 2	25,001-50,000
Bracket 3	50,001-75,000
Bracket 4	75,001-100,000
Bracket 5	101,000-200,000
Bracket 6	200,001-300,000
Bracket 7	301,000-400,000
Bracket 8	400,001-500,000
Bracket 9	Over 500,000

on characteristics of e- cigarettes, its chemical content, health effects of e-cigarettes, regulation status and policies on e-cigarettes. A correct answer to individual question was assigned a score of "one" while a wrong answer fetched a score of "zero". A cumulative score range of 0-4.99 indicated that the participant had insufficient knowledge about e-cigarettes whilst a cumulative score range of 5-10 demonstrated that the participant had sufficient knowledge about e-cigarettes. Section four recorded the attitude of participants towards e-cigarettes and consisted of 13 items. These set of questions measured the attitude and beliefs towards e-cigarettes as well as perceived advantages and disadvantages of e-cigarettes with the use of a Likert scale. It was categorized as attitudes supporting e-cigarette use and attitudes opposing e-cigarette use. Response options on the 5-point Likert scale included "Strongly Agree"," Agree", "Neutral", "Disagree" and "Strongly Disagree". Corresponding points were given depending on the question: 5 points merited to responses having positive attitudes opposing the use of e- cigarettes while those with negative attitudes supporting e-cigarette use garnered only 1 point. Participants who obtained a score of 40 points or higher were classified as having positive attitudes opposing e-cigarette use while those who obtained a score of 39 or less were classified as having negative attitudes supporting e-cigarette use.

Data were coded and entered in a computer to facilitate retrieval, processing and statistical analyses. The questionnaire was tested in a pilot study which preceded the main study to test the feasibility of this approach. The pilot study included 25 nursing students of level 3 at the Western Visayas State University, who were selected using the simple random sampling technique. This study determined the appropriateness of the data collection method and assisted to identify if the questionnaire format was comprehensible. The data from the pilot study were not included in the main study. The standardized instrument underwent reliability testing with Cronbach's alpha score of 0.71 for knowledge and 0.89 for attitude.

Permission to conduct the study was secured from the University President of WVSU and from the Dean of the College of Nursing. The chi-square test was used to determine the significance of difference between

the scores obtained by the participants across different variables. Pearson's Correlation Coefficient was used to measure the degree of association between knowledge and attitude of the nursing students towards e-cigarettes. The p-value for all inferential treatments was set at 0.05.

Results

Majority of the participants in this investigation (89.34%) were female and more than half of the participants (66.30%) belonged to Bracket 9 on the socioeconomic status scale. A large number of subjects were never smokers (80.33%), while 11.48% were former smokers and 8.20 % were current smokers. Most of the participants (93.40%) were aware of the existence of e-cigarettes and the most common source of this knowledge were "friends" (n = 95, 77.87%) (Tab. II).

The nursing students had poor knowledge (Mean score 3.50 ± 1.64) on e-cigarettes particularly on the characteristics of e- cigarettes, chemical content, health effects, regulation status and policies (Tab. III). Participants belonging to bracket 5 had a significantly higher mean score (4.20 ± 2.35) for knowledge when compared to other brackets on the socioeconomic status scale (p = 0.03). Also, current smokers had a statistically significant (p = 0.04) higher mean score (4.30 ± 1.64) for knowledge when compared to never smokers (3.42 ± 1.66) and former smokers (3.50 ± 1.40). However, when classified according to sex, socioeconomic status, smoking status and awareness status, the participants still demonstrated poor knowledge on e-cigarettes.

Overall, the level 4 nursing students exhibited an opposing attitude towards e-cigarette use (Tab. IV). However, when classified according to sex, socioeconomic status, smoking status and awareness status, the participants had a varying attitude toward e-cigarette use. Male participants demonstrated an attitude supporting e-cigarette use (mean score 39.85 ± 4.90) while female participants had a mean score of 40.07 which favoured attitude opposing e-cigarette use. However, this difference was statistically insignificant (p = 0.19). In terms of socioeconomic status, participants belonging to Bracket 5, 6 and 8 had an attitude opposing e-cigarette while participants belonging to Bracket 7 and Bracket 9 had an attitude supporting e-cigarette use (p = 0.67) (Tab. IV4). Majority of the participants were never smokers and maintained an attitude opposing e-cigarette use. Former smokers favoured an attitude opposing e-cigarette use while, participants who were current smokers had an attitude supporting e-cigarette use (p = 0.03). Furthermore, participants who were aware about the existence of e-cigarettes exhibited an attitude supporting the use of e-cigarettes when compared to students who had not heard about e-cigarettes previously (p = 0.04).

Pearson's correlation coefficient demonstrated that there was no significant association between knowledge and association towards e-cigarettes among the nursing students (Computed r-value of -0.107 at 0.241).

Tab. II. Distribution of participants according to sex, socioeconomic status, smoking status, awareness status and source of awareness.

Category	Frequency (%)
Sex	
Male	13 (10.7)
Female	109 (89.3)
Socioeconomic status (STFAP bracket)	
Bracket 5	10 (8.2)
Bracket 6	7 (5.74)
Bracket 7	16 (13.11)
Bracket 8	6 (4.92)
Bracket 9	80 (65.57)
Smoking status	
Non smoker	98 (80.33)
Former smoker	14 (11.48)
Current smoker	10 (8.2)
Awareness status	
Aware	114 (93.4)
Unaware	8 (6.6)
Source of awareness	
Friends	95 (77.87)
Internet	88 (72.13)
Saw one	81 (66.39)
TV/radio	49 (40.16)
Stores	48 (39.34)
Family	31 (25.41)
Printed materials	28 (22.95)
Overall	122 (100)

Tab. III. Knowledge of nursing students on e-cigarettes categorized according to sex, socioeconomic status, smoking status and awareness status.

Category	Mean (± S.D.)	Chi square test
Sex		
Male	3.46 (1.45)	$\chi^2(1) = 7.43$, p = 0.15
Female	3.50 (1.66)	
Socioeconomic status		
Bracket 5	4.20 (2.35)	$\chi^2(4) = 10.07$, p = 0.03
Bracket 6	2.88 (1.46)	
Bracket 7	3.00 (1.75)	
Bracket 8	3.33 (1.97)	
Bracket 9	3.60 (1.49)	
Smoking status		
Never	3.42 (1.66)	$\chi^2(2) = 4.6$, p = 0.04
Former	3.50 (1.40)	
Current	4.30 (1.64)	
Awareness status		
Aware	3.49 (1.65)	$\chi^2(1) = 7.2$, p = 0.14
Unaware	3.63 (1.51)	
Overall	3.50 (1.64)	

0.00-4.99: poor knowledge; 5.00-10.00: sufficient knowledge.

Tab. IV. Attitude of nursing students on e-cigarettes categorized according to sex, socioeconomic status, smoking status and awareness status.

Category	Mean (± S.D.)	Chi square test
Sex		
Male	39.85 (4.90)	$\chi^2(1) = 6.97$, $p = 0.19$
Female	40.07 (4.35)	
Socioeconomic status		
Bracket 5	40.60 (5.21)	
Bracket 6	40.63 (3.93)	$\chi^2(4) = 11.77$, $p = 0.67$
Bracket 7	39.94 (3.57)	
Bracket 8	42.67 (1.21)	
Bracket 9	39.81 (4.67)	
Smoking status		
Never	40.09 (4.41)	
Former	41.20 (3.36)	$\chi^2(2) = 5.9$, $p = 0.03$
Current	36.93 (5.69)	
Awareness status		
Aware	39.91 (4.47)	$\chi^2(1) = 5.3$, $p = 0.04$
Unaware	42.33 (2.24)	
Overall	40.09 (4.41)	

40.00-65.00: attitude opposing e-cigarette; 00.00-39.99: attitude supporting e-cigarette.

Discussion

Worldwide, e-cigarettes have surged in popularity with an increase in product awareness, rise in internet search queries, and growth in sales [18]. Media marketing strategies through print, television, radio, and the internet such as endorsing with popular celebrities and brandishing various flavours to e-cigarettes have further amplified the popularity of e-cigarettes. A real-time surveillance method based on internet search query data from Google showed that searches for e-cigarettes increased in all nations from July 2008 to February 2010; and were several hundred times greater than the search for smoking alternatives in the United Kingdom [2]. However, the major contributor to the boosted sales of these products is the frequent use of unsubstantiated marketing claims. These claims include: e-cigarettes are healthier and cleaner than conventional cigarettes; e-cigarettes are smoking cessation aids; and the aerosols emitted are safe for people who are exposed, among others. Although cited by some tobacco harm reduction advocates as a viable replacement for smoking, the limited scientific knowledge on the potential adverse health effects of the product has sparked disagreement and concern among healthcare authorities. Decades of efforts in tobacco control have reduced daily cigarette smoking prevalence across many countries worldwide. Any renormalization of tobacco through new products such as e-cigarettes would threaten to halt or reverse the progress made [9].

School level e-cigarette use has been associated with cigarette smoking susceptibility in never cigarette smokers. This is consistent with the e-cigarette industry's vision of using vaping to renormalize smoking [21].

It is possible that school environments with prevalent e-cigarette use normalized not only e-cigarette use but also "smoking-like" behaviours in general and thus led students to be more susceptible to cigarette smoking. This effect of e-cigarette use, if confirmed, would represent a pathway by which e-cigarettes negatively affect population health.

The use of e-cigarettes has a conflicting influence on assisting traditional smokers to quit cigarettes. A Cochrane review updated in 2016 concluded that nicotine e-cigarettes helped smokers quit smoking in the long term compared with placebo e-cigarettes but the evidence for this conclusion was rated low [4, 22]. However, a meta-analysis of 38 studies found that the odds of quitting traditional cigarettes were 28% lower in those who used e-cigarettes than in those who did not [4, 23]. Hence, it is critical to determine the knowledge and attitude related to use of e-cigarettes particularly among students.

Although, majority of participants in this investigation were females, both males and females demonstrated similar level of knowledge on e-cigarettes. This result is supported by the study of Lozano and colleagues (2015) who showed that levels of knowledge in students between sexes are similar [18]. However, community-based surveys have revealed that knowledge rate was higher among males (73.5%) than females (26.5%). Also, in the present survey, the male participants possessed an attitude supporting e-cigarette use when compared to females. This may be attributed to the fact the knowledge about cigarettes and similar products, including e-cigarettes is considered a taboo for females and hence female participants may deliberately deny knowledge of e-cigarettes and maintain an attitude opposing the use of these products to avoid retribution [24, 25].

Education and income levels have shown to have inconsistent association with the awareness of e-cigarettes [26]. Currently, there is no data on the knowledge of e-cigarettes amongst Filipinos based on their income bracket. In the present investigation, all nursing students demonstrated poor knowledge about e-cigarettes based on their annual family income bracket. This finding asserts the fact that e-cigarettes are comparatively a novel nicotine delivery product and no knowledge is imparted to the nursing students about e-cigarettes in their nursing curriculum. However, students belonging to the higher income groups i.e. bracket 7 and bracket 9 possessed an attitude supporting the use of e-cigarettes though this finding was not statistically significant. A plausible explanation for this outcome is that the participants from the higher socioeconomic strata of the society may display a pretentious behaviour and spuriously support the use of e-cigarettes as it is a relatively contemporary commodity.

An online survey of e-cigarette users found that 35% of the respondents heard about e-cigarettes from a personal contact, 41% from the internet, 10% via other media sources while 8% saw it being used [27]. Likewise, nearly all healthcare providers (92%) were aware of e-cigarettes in an investigation conducted in

Minnesota [28]. The most frequently cited sources of information about e-cigarettes for healthcare providers have been patient, news, stories, advertisements and internet rather than professional sources [18]. In the present study, almost all students reported that they had heard about e-cigarettes, indicating a high level of awareness. These results are in line with the results of other studies carried out in the United Kingdom and United States, which have also shown high awareness among smokers and non-smokers in the adult population [29-31]. Irrespective of the source of information; it cannot be denied that personal contacts and media have a vital role in the awareness of e-cigarettes.

The knowledge about the content and regulations of e-cigarettes has been low amongst the population. In spite of being aware of e-cigarettes, healthcare providers knew "a little" or "nothing at all" about e- cigarettes [28]. Majority of young adults did not know that some e-cigarettes contain nicotine and were incorrect about toxic chemical content of e-cigarette [28]. Compared to knowledge about e-cigarettes constituents, even fewer young adults were knowledgeable about the regulation [32]. The results of this study revealed that even though nursing students had poor knowledge and were not familiar with the characteristics of e- cigarettes, chemical content, health effects, regulation status and policies but they still possessed an attitude opposing to e-cigarette use. This suggests that the participants were aware of healthy demeanour and possessed an attitude promoting well being.

Knowledge about e-cigarettes may not necessarily be related to smoking status [24]. However, in the present study, current smokers had more information about e-cigarettes than former smokers and non-smokers probably due to their present exposure to smoking. Also, current smokers possessed an attitude supporting the use of e-cigarettes. Likewise, participants who were aware about the existence of e-cigarettes also displayed an attitude supporting the use of this product. With the current survey design, it is difficult to ascertain the rationale behind this result but one conceivable explanation is that the projection of e-cigarettes as smoking cessation tools as a marketing strategy, influences the decision of current smokers to exhibit an attitude supporting the use of e-cigarettes.

The current investigation provides new insights to the limited data available on the knowledge and attitude of nursing students towards e-cigarettes. In spite of the interesting findings, this study is not without drawbacks. Although the sample size for the study was sufficient to conduct a statistical analysis, it is not large enough to be representative of all nursing college students. The sample was drawn from the senior class and had higher proportions of female students. Thus, the study may not represent the knowledge and attitude of the entire student body particularly of male and younger college students. Therefore, the ability to generalize the results is limited. The study was based on questionnaire survey data and may thus be affected by reporting bias. The findings of the study pose an urgent need to be addressed in terms of the inadequacy of knowledge among nursing students in relation to chemical content, possible health effects and regulation of e-cigarettes.

Conclusions

Nursing students did not have adequate knowledge regarding e-cigarettes but maintained an attitude opposing e-cigarette use. Poor knowledge did not influence the attitude of participants towards e-cigarettes.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

Study conception and design: PM, TSM.
Data acquisition: PM, TSM.
Analysis and interpretation of results: PM, TSM, SAK.
Draft manuscript preparation: PM, TSM, SAK.
All authors reviewed the results and approved the final version of the manuscript.

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