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ORIGINAL RESEARCH

A survey exploring knowledge and beliefs about electronic cigarettes between health care providers and the general population in Egypt

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Background: Electronic cigarettes are increasing in popularity, and they are easily accessible in a variety of locations. Despite increasing its popularity, little is known about its overall health effects. Physicians have rated the most trustful source of information about it and play also a role in disseminating information about it. Thus, this study identified the difference in knowledge and beliefs about electronic cigarettes between health care providers and the general population in Egypt.

Methods: A cross-sectional study using the self-administered questionnaire in the Arabic language was conducted between December 2018 and March 2019 in the Chest Department in Ain Shams University Hospital in Egypt. Study population (n=610) was divided into health care providers (n=260) and general population (n=350).

Result: A total of 593 respondents participated in this study and returned filled questionnaire with total response rate=97.2%, only 8.8% of all participates were smokers, none of the study population reported using electronic cigarettes, despite that, 79.3% of the participants have heard of electronic cigarettes, media advertisements were the main source of getting to know it and there was a statistically significant difference between both groups regarding most beliefs and attitudes toward electronic cigarettes.

Conclusion: There was high awareness about electronic cigarettes in Egypt and more negative attitude about it among health care providers than the general population, but still educational programs and guidelines for health care providers are needed to raise more the awareness which will aid in counseling general population appropriately.

Keywords: Egypt, electronic cigarettes, general population, health care providers, knowledge

Introduction

Increasing the use of tobacco imposes a great fear on public health as it has been linked to significant increases in coronary heart diseases, strokes and lung cancers.[1] Tobacco is one of the major preventable causes of death in the world today and its usage kills up a lot of people[2] and this is expected to occur in the developing countries.[3] There were various kinds of cigarettes (flavored, unfiltered, filtered, manufactured), pipes and cigars.[4]

Egypt is considered one of the highest countries in the use of tobacco in the Arab region.[5] According to the WHO report, 22% of Egyptian populations are current and former smokers, of which 43% male and about 1% female.[6] Egypt has made great achievement in controlling tobacco use and reducing its harmful effects.

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Laws have banned indoor smoking in public places,[7] moreover, no selling tobacco products to those <18 years old by law.[8]

Recently, there has been a growing trend toward a new type of device called electronic cigarettes (battery-powered devices that do not burn tobacco but aerosolize liquid and other preservatives for inhalation).[9] The electronic cigarettes vaping is rapidly increasing worldwide[10] and this may be due to commerce and media with its different types that convince people that the electronic cigarette is less harmful than a traditional cigarette and help with smoking cessation. In addition, electronic cigarette has various pleasant flavoring choices. All these causes encourage people to use electronic cigarette.[11]

The electronic cigarette is also common among smokers who cannot quit traditional cigarette, but are ready to switch to another tobacco type less harmful and its popularity had also increased among teens that have never used cigarettes.[12] The long-term health effects of electronic cigarette are not yet known due to the short period since they had been known.[13] And this creates a new challenge for public health.[14] So, public health professionals are now divided into two groups, some consider it as a possible harm reduction tool for current smokers while others consider it the road to nicotine addiction and, in turn, other tobacco use. Therefore, WHO recommends limiting the sale of electronic cigarettes to the minimal, as well as its advertisement in the media.[15] The Food and Drug Administration recently also announced at the beginning in 2018 that all e-cigarette advertisements and packaging need to affix a warning label[16] stating the following: "WARNING: This product contains nicotine. Nicotine is an addictive chemical".[17]

Although the literature on this topic is limited, it was found that 7–27% of smokers have discussed electronic cigarette with their physicians[18] and a lot of the physicians lack the needed knowledge to give informed and valuable advice for patients and their families.[19] Thus, this study aimed to assess the level of knowledge and beliefs of electronic cigarette among the health care providers and the general population and to compare the knowledge and the beliefs between them about the electronic cigarette.

Materials and methods

Study design

The cross-sectional study was carried out from December 2018 to March 2019 in the Chest Department in Ain Shams University Hospital in Cairo, Egypt. Verbal informed consent was acceptable and approved by the Ethical Review Committee of the Faculty of Medicine, Ain Shams University.

Study sample

In this study, we targeted a convenience sample from two groups: the first group involved health care providers, who were either physicians or nurses working at the Chest Department in Ain Shams University Hospital; and the second group involved general population who were selected from among the visitors or workers in the same participating center who were 18 years or older and can read and write. The targeted sample size in each group was calculated;[20] a total of 593 respondents participated in this study and returned filled questionnaires (of a total 610 targeted sample); 252 health care providers (of 260 targeted sample) and 341 general population (of 350 targeted sample).

Potential participants from both target groups provided verbal informed consent to share in this study after informing them about the aim of the study and that their sharing was not obligatory at all and they were given time to ask any inquiries if necessary.

Survey questionnaires were self-administered and distributed by the research team who was divided into three groups, researcher distributed a questionnaire to health care providers and other researcher distributed a questionnaire to the general population away from the first researcher until the target sample size was achieved and then data were analyzed by the third researcher by coding as a blind technique to avoid any bias.

Study tool

A self-administered questionnaire was adapted from previous relevant literature.[21–23] The questionnaire was in English then translated into Arabic language and back-translated into English for validation. A pilot test included 25 subjects (10 of health care provider and 15 of general populations) to test accuracy and the language of the questionnaire. Pilot test results were not included and no correction was conducted in the wording of the questionnaire after it. The final questionnaire consisted of three sections: Section I included data regarding participants' personal characteristics such as age (in years), gender and level of education, participants smoking status and type of tobacco used (cigarettes, water pipe, cigar, electronic cigarettes), and the duration of being a health care provider (for health care provider only: less than or equal

5 years, 6–10 years, 11–15 years and more than 15 years); Section II included knowledge about electronic cigarettes included whether participants have ever heard of electronic cigarettes; those who have not ever heard of electronic cigarettes were asked to end the questionnaire at this stage and participants who have heard of electronic cigarettes were further asked how did they first learn about electronic cigarettes. Participants self-evaluated how much they knew about electronic cigarettes, and reported approximately what percentage of their friends (or patients if they were health care providers) were electronic cigarette users. Then, participants completed Section III, which included: beliefs and attitudes toward electronic cigarettes (all answers ranges from strongly agree to strongly disagree on a 5-point Likert scale) by asking them whether they thought electronic cigarettes: are safe, aid for smoking cessation, encourage smoking initiation and continuation, may cause long-term health effects, are a public health concern, should be avoided in public areas, can lower cancer risk than traditional cigarettes and whether they recommend the use of electronic cigarettes.

Statistical analysis

A continuous variable was presented as mean and standard deviation. Comparisons between means were done using the independant samples *t*-test for independent samples. Categorical data were presented as number and percentages. Comparison between proportions was done using the chi-square test. Data were statistically significant when *p* -values=0.05 or less. Data were analyzed by SPSS version 20.

Results

The studied sample

A total of 593 respondents participated in this study and returned filled questionnaires (of a total 610 targeted sample, total response rate=97.2%); 252 health care providers (of 260 targeted sample, response rate among health care providers=96.9%) and 341 general population (of 350 targeted sample, response rate among health care providers=97.4%).

Participants' age ranged from 18 to 64 years with a mean age of 30.6±10.3 years. Health care provider participants (33.9±8.8) were older than the general population participants (28.1±10.7) and this difference was statistically significant t=7.071, $p<0.001$.Most participants were female (63.2%), however there were significantly more female participants in the health care provider group (74.2%) compared to the general population group (55.1%), $p<0.001$.The highest educational level reported by participants was a master's degree in health care provider and a bachelor's degree in the general population. The majority of health care providers (56.0%) reported receiving a bachelor's degree while the majority (63.9%) of the general population reported receiving general secondary education. Only 8.8% of all participants were smokers. All smokers reported only cigarette smoking, none of the studied population reported using electronic cigarettes. Smoking was reported more in the general population group (11.7%) compared to the health care provider group (2.4%), $p<0.001$ in Table 1.

Knowledge about electronic cigarettes

Most participants have heard of electronic cigarettes (n=470, 79.3%); significantly more among the general population (85.3%) than health care providers (71.0%), $p<0.001$.Participants who have not ever heard about electronic cigarettes (n=123, 20.7%) discontinued the questionnaire at this stage in Table 2.

Media advertisements were the main source of getting to know electronic cigarettes for the first time among participants (50.4%). Also, a considerable proportion of participants first heard about electronic cigarettes from their friends or clients (33.2%) in Table 2.

The majority of both health care providers and the general population considered they knew a little about electronic cigarettes (65.4% and 65.3%, respectively). However, significantly more general population knew nothing at all about electronic cigarettes compared to health care providers (16.2% versus 8.9%, respectively), $p=0.001$ in Table 2.

Almost all participants (91.2%) reported that approximately only a quarter or less of their friends or patients were electronic cigarette users in Table 2.

Beliefs and attitudes toward electronic cigarettes

There were significant statistical difference in most of the beliefs and attitudes between participants,most of the health care providers believe that electronic cigarette was unsafe, did not help in smoking cessation, and encouraged smoking continuation and contain chemicals that may cause long-term health effects and should be regulated in public places and did not lower cancer risk, but both

Table 1 Characteristics of the studied sample

		Total N=593	Health care providers N=252		General population N=341		Chi-square	*p*-value
		No (%)	No	%	No	%		
Gender	Female	375 (63.2)	187	74.2	188	55.1	22.679	<0.001
	Male	218 (36.8)	65	25.8	153	44.9		
Age categories	18-	347 (58.5)	105	41.7	242	71.0	59.871	<0.001
	30-	132 (22.3)	90	35.7	42	12.3		
	40-	71 (12.0)	34	13.5	37	10.9		
	50+	43 (7.3)	23	9.1	20	5.9		
Education	General secondary	218 (36.8)	0	0	218	63.9	369.624	<0.001
	Technical education	44 (7.4)	0	0	44	12.9		
	Post-secondary diploma	68 (11.5)	59	23.4	9	2.6		
	Bachelor's degree	211 (35.6)	141	56.0	70	20.5		
	Master's degree	52 (8.8)	52	20.6	0	0		
Smoking status	Smokers	46 (7.8)	6	2.4	40	11.7	18.021	<0.001
	Ex-smokers	37 (6.2)	15	6.0	22	6.5		
	Non smoker	510 (86.0)	231	91.7	279	81.8		

(68.1%) health care providers and (60.8%) general population agreed that that electronic cigarette was public health concern in Table 3.

Only 6.9% of health care providers and 10.8% of the general population recommended e-cigarette to others. The difference between participant was statistically insignificant (chi-square test =1.972, p=0.188).

Discussion

The electronic cigarettes' popularity nowadays is rising globally, although data available on its safety and efficacy are limited.[24] And the rate of its awareness and usage are not known in some countries.[25] But some studies showed a significant rise in its awareness over recent years.[26]

Physicians have rated the most trusted sources of information for smokers; thus, they play the main role in disseminating information to the general population.[27] Therefore, this study was conducted to compare the knowledge and beliefs about electronic cigarettes between the health care providers either physicians or nurses who deliver education and guidance about electronic cigarettes and the general population who use it in Egypt.

In the present study, most participants 63.2% were female, the majority of health care providers reported receiving a bachelor's degree and most of the health care provider participants 47.2% have been working in the health care since <5 years, which means that they were junior staff and this was the target group who deal with general population and spread information about electronic cigarettes while the majority of the general population reported receiving general secondary education.

Most of participants (79.3%)in this study have heard of electronic cigarette, more among the general population (n=292, 85.3%) than health care providers (n=179, 71%) and this can be explained that the majority of health care providers were female who may have less knowledge and interest in the matter as 70 of 73 health care providers who did not hear about e-cigarette and did not continue the questionnaire were female and three of them only were male and this point needs to have focus on it as physician regardless the gender should know enough knowledge about e-cigarette to deliver information about it to the general population.

Abo-Elkheir and Sobh[28] studied the prevalence of knowledge about electronic cigarettes and its use among the Egyptian population in 2016 and it was found that the awareness rate was 57.5% and 75.4% of their participants were male but there was still an agreement with the present study with higher awareness rate in the present study although the majority were female. But awareness rate about electronic cigarettes in this study was lower than the study carried out in Saudi Arabia by Karbouji et al[29] who found that the awareness about electronic cigarettes was 93.6% and the majority of their participants were male and lower than the study carried out in Malaysia in which 95% of their studied population was aware of it[30] and the

Table 2 Knowledge about electronic cigarettes among study participants

		Total N=593	Health care providers N=252		General population N=341		Chi-square	*p*-value
		No (%)	No	%	No	%		
Have you ever heard of electronic cigarettes, yes		470 (79.3%)	179	71.0	291	85.3	18.039	<0.001
		N=470	N=179		N=291			
How did you first learn about electronic cigarettes	Media advertisement	237 (50.4)	83	46.4	154	52.9	33.196	<0.001
	Newspapers	11 (2.3)	4	2.2	7	2.4		
	Roadside poster	5 (1.1)	0	0.0	5	1.7		
	Patients	15 (3.2)	10	5.6	5	1.7		
	Friends or clients	156 (33.2)	50	27.9	106	36.4		
	Professional source	14 (3.0)	12	6.7	2	0.7		
	Other	32 (6.8)	20	11.2	12	4.1		
How much do you know about electronic cigarettes	Nothing at all	63 (13.4)	18	8.9	47	16.2	16.929	0.001
	A little	307 (65.3)	117	65.4	190	65.3		
	A moderate amount	90 (19.1)	46	25.7	44	15.1		
	Quite a lot	10 (2.1)	0	0.0	10	3.4		
About what percentage of your friends or your patients use electronic cigarettes	0–25%	429 (91.2)	177	98.9	252	86.6	21.431	<0.001
	26–50%	14 (3.0)	0	0.0	14	4.8		
	51–75%	15 (3.2)	0	0.0	15	5.2		
	76–100%	12 (2.6)	2	1.1	10	3.4		

majority of their participants were female and the possible explanation for the higher awareness rate in both studies that the participants were using e-cigarettes (68.9% and 13.8%, respectively).

Among our studied groups, only 8.8% of all participants were smokers to traditional cigarettes and none of them were using e-cigarettes which were similar to the study done in Egypt 2016,[28] nobody of them reported use of e-cigarettes and up to our knowledge there was no study that had assessed the prevalence of electronic cigarette's user in Egypt, although in the present study we asked participants approximately about what percentage of their friends (or patients if they were health care providers) were electronic cigarette users and almost all participants (91.2%) reported that approximately only a quarter or less of their friends or patients were electronic cigarette users but we still need further studies to assess the actual prevalence of electronic cigarettes user in Egypt. Zhu et al[31] carried their survey of the US population and the sample size was 10,041 and they found that 75.4% heard about e-cigarette, 8.08% of them had tried it and 1.44% was already using it and this revealed high awareness rate in Egypt although we used a smaller sample size and none of the participants were e-cigarette user.

The main source about electronic cigarettes in this study was media advertisement (50.4%) while in the earlier study, which was done in Egypt,[28] 74.8% of them had heard about it from multiple sources.

And in the previous studies,[32] the Internet, friends or personal contacts, and advertisements were the most common sources mentioned. Martínez-Sánchez et al[33] stated that most participants had learned about it through traditional media. While Zhu et al.[31] found that most of the elderly with low education heard about electronic cigarettes from television while the young people with high education heard about it from the Internet. Meanwhile, other studies found that information on electronic cigarette spread widely through social media.[34]

Table 3 Beliefs and attitudes toward electronic cigarettes among study participants

Electronic cigarettes:	Health care providers N=179					General population N=291					Chi-square	*p*-value
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Strongly agree	Agree	Neutral	Disagree	Strongly disagree		
Are safer to use than regular cigarette	0.0	11.2	21.8	35.8	31.3	4.1	17.2	32.3	33.0	13.4	32.182	<0.001
Are a helpful aid for smoking cessation	0.0	13.4	29.6	31.3	25.7	2.7	17.5	30.9	35.4	13.4	15.981	0.003
Encourage smoking initiation in those who have never smoked	10.6	20.1	4.5	34.6	30.2	10.0	27.1	19.6	23.0	20.3	30.561	<0.001
Encourage smoking continuation among smokers who might have quit otherwise	21.7	41.1	16.6	16.0	4.6	17.2	32.6	27.8	19.9	2.4	11.772	0.019
Contain some chemicals that may cause long-term health effects	35.8	49.2	6.7	3.9	4.5	17.9	46.0	26.1	8.2	1.7	43.091	<0.001
Use is a public health concern	22.3	45.8	19.0	10.6	2.2	19.9	40.9	26.1	11.3	1.7	3.546	0.471
Should be regulated in public areas	40.2	29.1	2.2	15.1	13.4	28.5	32.0	21.6	11.0	6.9	40.740	<0.001
Can lower cancer risk	3.9	13.4	16.8	33.5	32.4	4.1	20.6	39.2	30.9	5.2	74.621	<0.001

In the study done in Egypt 2016,[28] 68.1% believe that electronic cigarette was unsafe than traditional cigarettes but in this study only 46% of the general population believe that e-cigarette was unsafe and this can be explained due to marketing and media that play a major role in making people believe that e-cigarette is less harmful than traditional cigarettes.[11]

But our results were still better than Karbouji et al[29] who found that only 10.7% only believe that they are as dangerous as or more dangerous than cigarettes. In contrast, 67.1% of health care providers believe that e-cigarette was unsafe and this was a good point as physicians were the major source to balance the widely available information about e-cigarettes from different sources which may not be evidence-based or scientifically accurate.

57% of our health care providers and 48.8% of general population who heard about e-cigarette disagree that it helps in smoking cessation that was nearly similar to the study done in Egypt 2016[28] as 58.4% disagree that electronic cigarettes aid in smoking cessation, but different from Karbouji et al[29] in which only 13.4% disagree that electronic cigarettes help in smoking cessation and this may be due to 68.9% were vape users, 5.9% used to smoke vape in the past, so they had some biases toward e-cigarette, while in this study and study done in Egypt 2016,[28] none of the participants were e-cigarette user.

Both Abo-Elkheir and Sobh,[28] and Karbouji et al[29] discussed knowledge about electronic cigarettes in the general population only in the Arab region in Egypt and Saudi Arabia while in this study, we compared the beliefs and attitudes about electronic cigarettes between the general population and health care providers.

Conclusion

There was high awareness about electronic cigarettes in Egypt and more negative attitude about it among health care providers than the general population, but still educational programs and guidelines for health care providers are needed to raise more the awareness which will aid in counseling general population appropriately.

Abbreviations

E-cigarette, electronic cigarette; WHO, World Health Organization.

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Disclosure

The authors report no financial interest or other conflicts of interest in this work.

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