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The Prevalence of Use, Awareness and Beliefs of Electronic Cigarettes Among College-Based Health Care Students At A Southeastern Urban University

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THE PREVALENCE OF USE, AWARENESS AND BELIEFS OF ELECTRONIC CIGARETTES AMONG COLLEGE-BASED HEALTH CARE STUDENTS AT A SOUTHEASTERN URBAN UNIVERSITY

by

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Acceptance

This thesis, THE PREVELANCE OF USE, AWARENESS AND BELIFS OF ELECTRONIC CIGARETTES AMONG COLLEGE-BASED HEALTH CARE STUDENTS AT A SOUTHEASTERN URBAN UNIVERSITY, by Abdullah Mayof Alanazi, RRT-NPS, was prepared under the direction of the Master's Thesis Advisory Committee of the Respiratory Therapy department at Georgia State University. It is accepted by the committee in partial fulfillment of requirements for the Master's of Science degree in Respiratory Therapy at Byrdine F. Lewis School of Nursing and Health Professions, Georgia State University. The Master's Thesis Advisory Committee, as representatives of the faculty, certifies that this thesis has met all standards of excellence and scholarship as determined by the faculty.

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THE PREVALENCE OF USE, AWARENESS AND BELIEFS OF ELECTRONIC CIGARETTES AMONG COLLEGE-BASED HEALTH CARE STUDENTS AT A SOUTHEASTERN URBAN UNIVERSITY

A thesis submitted by

Abdullah Mayof Alanazi, BS, RRT-NPS

in partial fulfillment of requirements for the degree of

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in

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in

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in the

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Georgia State University,

Atlanta, Georgia

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by

ABDULLAH MAYOF ALANAZI, BS, RRT-NPS

(Under the Direction of Dr. Lynda T. Goodfellow)

ABSTRACT

Background: Electronic cigarettes are used to deliver nicotine to consumers. E-cigarettes are claimed to be an alternative method for smoking cessation. The use of electronic cigarettes is increasing among young people, especially current and former smokers. It is unknown what the harm or benefit that result from e-cigarettes' use of the individuals on the well-being.

Purpose: This study was conducted to explore the prevalence of e-cigarettes use and exposure among college-based health care students. Also to assess the awareness level and beliefs in regard to electronic cigarettes use among the college-based health care students.

Methods: 217 college-based health care undergraduate students from nursing, nutrition and respiratory therapy programs were surveyed in this study. The survey was composed of 17 questions in regards to the awareness, prevalence of e-cigarettes use and beliefs about e-cigarettes use. The data analysis included descriptive statistics, independent sample t-test and one-way ANOVA. A significance level was set at 0.05.

Results: The response rate was 98.1%, 87% of the respondents were female and 70% were between the ages of 19-25 years. Most of the respondents were nursing students (47.5%); followed by nutrition students (29.5%); and respiratory therapy students (23%). Most of the respondents were non-smokers (83.4%); former smokers were 13.8%; and smokers were 2.8%. Almost all the respondents had heard of e-cigarettes (99.5%), and 21.2% had tried e-cigarettes at least once in their lifetime. The mean awareness score was 5.1 (SD 0.11); smokers showed the highest mean awareness score of 6.0±2.28. The majority of the participants disagreed that e-cigarettes are less dangerous than traditional cigarettes or can help smokers to quit; and more than half of the participants disagreed that e-cigarettes are used only by smokers. There was a significant difference among male (5.71±1.51) and female (5.03±1.71) in regards to the e-cigarettes awareness level ($p=0.047$). The awareness level was significantly different among respondents who had previously used e-cigarettes (5.63±1.49) than participants who have not tried e-cigarettes at least once during their lifetime (4.98±1.72) ($p=0.021$)

Conclusion: This study found that most of the students in the college of nursing and health professions were not e-cigarettes' users. People who have tried e-cigarettes, have friends who have tried e-cigarettes as well. Furthermore, curiosity is the major reason that led them to try e-cigarettes. E-cigarettes' awareness is high among smokers and e-cigarettes' users; older students seem to have higher awareness than younger students. There were general disagreements on the use of e-cigarettes as a less dangerous alternative to tobacco cigarettes to help smokers to quit. Finally, male and female participants showed significant differences in their awareness of e-cigarettes.

KEY WORDS: Electronic Cigarette, E-cigarette, Prevalence of Use, Awareness, Perception, Beliefs, Students, College Students, Health Care, and Health Professions

DEDICATION

First and foremost, I would like to express my ultimate thanks to God (Allah) for all the strength and health that I am blessed with throughout my life. My warmest gratitude goes to my soldiers who fought hard and raised me well with love, compassion, honor, and dignity. Therefore, my hard work, success, and achievements are dedicated to my beloved parents (Mayof and Jawza). Thank you, Dad and Mom, for being as ideal as I see you.

Since 2011, I have been gifted by sharing my life with a great woman who believed in me and dedicated her time to support my dreams. My beloved wife (Fatimah), your sincere existence and ultimate love are the power that I succeed with everyday. I wish to celebrate with you every success in our life, as happy and healthy as we are, my lovely wife.

I thank my great siblings who vouched for me and constructed my personality with passion, ability and empowerment. Thank you, my great family, for having me surrounded with your great existence.

I would like to dedicate my master's degree to the memory of my close friend, Salman (May Allah rest his soul in peace and grant him Jannah). His vision in me will never be forgotten.

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Chapter I

Introduction

After the surgeon general's report in 1964, tobacco companies have been pushed to produce safer and lighter cigarette substances (Trumbo & Harper, 2013). This effort has led the market to advertise low-tar and reduced harmful cigarette ingredients as claimed by some tobacco companies. Different products have been sold in the last ten years as modified tobacco cigarettes that are advocated to reduce the toxicity level of the cigarette contents (Trumbo & Harper, 2013). Electronic cigarettes (e-cigarettes) are the newest devices in the tobacco market. E-cigarettes contain liquid that mixes nicotine with different additives and flavors. The nicotine is orally inhaled by a battery operated vaporizing device. E-cigarettes mimic the combustible cigarettes in terms of shape and behavior; when the smoker inhales, the flow trigger will activate the LED light to heat and switch the nicotine liquid to mist (Trumbo & Harper, 2013; Rahman, Hann, Wilson & Worrall-Carter, 2014; King, Alam, Promoff, Arrazola & Dube, 2013; Choi & Forster, 2013).

E-cigarettes are marketed as a safe alternative to traditional cigarettes because they only have nicotine and none of the approximately 4000 toxic carcinogenic chemical ingredients that are in combustible cigarettes. However, the United States Food and Drug Administration detected some toxic substances in samples of e-cigarettes, such as nitrosamines, carbonyl compounds, diethylene glycol and volatile organic compounds. These elements are known to also be implicated in carcinogenic and cardiovascular related diseases and are believed to exaggerate respiratory symptoms in asthma and rhinitis (Rahman et al., 2014; King et al., 2013; Choi & Forster, 2013).

The first sale of e-cigarettes in the market was in 2005. Then the online search for e-cigarettes rapidly became greater than that for any other alternative smoking device in the US,

Canada, the United Kingdom and Australia. E-cigarettes' inquiries in the U.S. were 300% greater than those for nicotine replacement therapy (NRT); moreover, the online sale of e-cigarettes account for revenues in early 2009 of more than $100 million (Trumbo & Harper, 2013). The use of e-cigarettes is quickly rising, particularly among current smokers. In the United States, 50% of current adult smokers have been influenced to try e-cigarettes and 32% are likely to have smoked them (King et al., 2013; Pokhrel & Herzog, 2014). Prediction analyses suggest that many current adult smokers are seeking alternative forms of smoking to decrease their use of combustible cigarettes or to reduce nicotine withdrawal symptoms, which sequentially will help them to stop smoking (King et al., 2013; Polosa, 2015).

A systematic review has found that e-cigarettes are more commonly used among current tobacco smokers and former smokers than non-smokers. The majority of them are male, middle-aged and located in Europe and the United States use (Rahman et al., 2014). The motivation to use e-cigarettes is variable; most people smoke them to stop smoking traditional cigarettes and for recreational use (Rahman et al., 2014). The use of e-cigarettes has created a shift in tobacco addiction from tobacco smoke to nicotine smoke per se (Trumbo & Harper, 2011). However, the current concerns relating to e-cigarettes are that they are not regulated, which make them susceptible to abuse and consumption by young people, thereby hindering the effectiveness of tobacco cigarette cessation. Currently, there is no scientific evidence that e-cigarettes help in long-term cessation, and the U.S. Public Health Service does not recommend it as a smoking cessation aid (King et al., 2013; Rahman et al., 2014).

In the US, about 6000 people smoke cigarettes for the first time every day, and half of them are under the age of 18 (Chaffee et al., 2015). E-cigarette use has sharply increased among male high school students in the US as alternative products to combustible cigarettes. However, some

of them have never tried smoking cigarettes before, which questions the health outcomes of upcoming e-cigarette users in the future (Chaffee et al., 2015). In comparison, between 2010 and 2011 in the US, the awareness of e-cigarettes has increased to about six out of ten adults (King et al., 2013). The current cigarette smokers (21%) have used e-cigarettes, and the majority of smokers have heard and are aware of e-cigarettes. Most current adult cigarette smokers believe that e-cigarettes are safer than combustible cigarettes; furthermore, the young and educated male population tends to try e-cigarettes at a higher rate than females (Trumbo & Harper, 2013; Pokhrel & Herzog, 2014). It is important to study the perception, awareness and use of e-cigarettes among young adult people. There are limited data that assess the awareness and use of e-cigarettes among the adult population in the US. The college-based health professional students should be aware of the known risks of e-cigarette use (Choi & Forster, 2013; Trumbo & Harper, 2013; King et al., 2013).

Statement of the Problem

The huge increase in adults using e-cigarettes suggests that there should be studies on its influence on the population. The awareness and beliefs in regard to electronic cigarettes among the college-based health care students are unknown and need to be addressed. Electronic cigarettes use among young adults is a public health concern and should be studied among different populations (i.e. college-based health care students).

Purpose of the Study

The purpose of this study was to assess health care students' prevalence of use, awareness and beliefs of electronic cigarettes. This research addressed the following questions:

1- What was the prevalence of e-cigarettes exposure among the college-based health care students?

2- What was the awareness of e-cigarettes among the college-based health care students?

3- What are the beliefs of the college-based health care students about the use of e-cigarettes?

4- What were the socio-demographic factors that influenced the prevalence of use, awareness and beliefs of e-cigarettes among the college-based health care students?

Significance of the Study

This study explored the awareness and use of e-cigarettes among health care students in a southeastern urban university. The findings looked at trends in the awareness of e-cigarettes and the beliefs surrounding them; moreover, it revealed the use of e-cigarettes among health care students. Health care practitioners are responsible for providing appropriate patient education about safe and harmful aspects of e-cigarettes with accurate scientific information. Health care students' awareness of the use of e-cigarettes will be significant in terms of dealing with e-cigarettes' impact on well-being in the future. The level of awareness of this abusive behavior will facilitate the scope of education so that it includes the harmful and safety aspects of e-cigarettes use in the academic curriculum and public symposiums.

Summary

The considerable increase in young people's consumption of electronic cigarettes (e-cigarettes) advocates the need to study the impact of this product on the population. College-based health care students are a vulnerable cluster in the environment of health care because of their lack of experience of harmful versus safe perceptions toward novel new products. Therefore, exploration of the prevalence of the use, awareness, and beliefs in terms of e-cigarettes is needed. Health care students are future health care clinicians, which requires public health authorities to educate them and make them aware about the negative aspects of e-cigarettes that affect one's well-being.

Definition of Terms

E-cigarettes: Electronic cigarettes

ENDS: Electronic Nicotine Delivery System

NRT: Nicotine Replacement Therapy

ATP: Alternative Tobacco Products

Polytobacco: tobacco cigarette and alternative tobacco products

Dual user: tobacco smoker and e-cigarette user

Single user: e-cigarette use only

FDA: Food and Drug Administration

CDC: Center for Disease Control and Prevention

LED: Light-emitting diode

COPD: Chronic Obstructive Pulmonary Disease

Chapter II

Review of the Literature

The aim of this literature review was to explore the prevalence of use, awareness, and beliefs in terms of e-cigarettes among college-based health care students. The databases searched for this literature review include EBSCOhost, PubMed, CINHAL, and Google Scholar, utilizing combinations of the following key words: electronic cigarette, e-cigarette, prevalence of use, awareness, perception, beliefs, students, college students, health care, and health professions. The literature review outlines the e-cigarette device itself, the prevalence of use of e-cigarettes, awareness about e-cigarettes, the beliefs surrounding e-cigarettes, and the impact of e-cigarettes on students. This review was intended to answer the following research questions:

1- What was the prevalence of e-cigarettes exposure among the college-based health care students?
2- What was the awareness of e-cigarettes among the college-based health care students?
3- What are the beliefs of the college-based health care students about the use of e-cigarettes?
4- What were the socio-demographic factors that influenced the prevalence of use, awareness and beliefs of e-cigarettes among the college-based health care students?

Electronic Cigarettes Device

Electronic cigarettes (e-cigarettes), known as an electronic nicotine delivery system (ENDS), is a method of inhaling the nicotine vapor with different flavors without the need to smoke tobacco. It is similar in appearance to traditional cigarettes, pen or cigar but no combustion or smoke is involved. Instead, the device contains a battery-powered atomizer that delivers a vaporized nicotine solution in glycerine or propylene glycol additives. Ordinarily, the device is composed of a metal or plastic tube and a heating LED (light-emitting diode) tip which heats the

e-cigarette's liquid (e-liquid or e-juice) into inhalable vapor. The atomizer e-cigarette solution is available for sale in a refillable or pre-filled cartridge (cartomizer) in a single unit to avoid any leakage of the solution (Dockrell et al., 2013; Etter, Zather & Svensson, 2013; Goniewicz, Hajek & McRobbie, 2014; Czoli, Hammond & White, 2014; Wu et al., 2014).

In 2004, a Chinese company called Ruyan introduced e-cigarettes to the market. Then, in 2006, e-cigarettes were marketed in the US and Europe, following which, e-cigarettes' value in the global market became two billion US dollars as of 2012. In the US, most of the major tobacco companies have declared entry into the e-cigarettes industry, and advertising and sales are widespread over the Internet (Dockrell et al., 2013; Czoli et al., 2014).

The nicotine content in e-cigarettes can be labeled in weight as mg/cartridge, or percentage of volume if the nicotine solution is fixed in each cartridge. Goniewicz et al. (2014) studied the nicotine content in six popular e-cigarette products in the UK, bought on the Internet. They found a 12 percent variation in relative standard deviation (RSD) between the vaporized nicotine and the labeled nicotine within each patch of the e-cigarette; also, they discovered that all the tested brands delivered less nicotine per puff than combustible cigarettes. However, Etter et al. (2013) examined the nicotine content of 20 modules of re-fill liquid e-cigarettes from 10 brands, from four different countries (France, Switzerland, UK and US) and the results revealed a close dosage between the re-filled nicotine content and the labeled content. The major limitation to this study is that they tested only one patch from each module so we cannot discover whether the same correlation exists in all patches. Another limitation is that they merely examined the re-fill liquid of the nicotine and not the vaporized content of the nicotine and new substances could appear after vaporizing the liquid.

The e-cigarettes deliver variable amounts of nicotine, which is the main additive component extracted from tobacco cigarettes. Nicotine is a potent toxic substance that has a harmful influence on the neurological activity of the brain by arousing the nicotinic cholinergic receptors. Indeed, the lethal oral dose of nicotine in children is 40-60 mg and 0.8-1.0 mg/kg in adult non-smokers (Goniewicz et al., 2013; Etter et al., 2013; Baeza-Loya et al., 2014; Purssell, 2014; Cope, 2014). A clinical trial conducted on electronic cigarettes consumers revealed that the nicotine level approximates to the amount gained from tobacco smoking and twice as high as that of approved nicotine replacement therapies. Moreover, the cotinine (nicotine) level that is found in the saliva of e-cigarettes users is higher than in former smokers who used nicotine medications (Etter et al., 2013; Etter, 2014).

Several tobacco-related cardiovascular diseases are blamed on nicotine itself because of its effect on stimulating the sympathetic nervous system and the epinephrine level in the body, for example nicotine is imputed in cardiac arrhythmia, myocardial injury and hypertension in cigarette smokers. Therefore, e-cigarettes are not recommended to be endorsed to patients suffering from cardiovascular diseases, despite the fact that e-cigarettes do not involve any carbon monoxide (CO) or any other combustible products (Cope, 2014). Exposure to nicotine is a great risk factor for prenatal development and fetal harm, and the delivery of nicotine to the fetus may lead to spontaneous abortion, sudden infant death syndrome (SIDS), behavioral problems and attention-deficit/hyperactivity disorder (ADHD). Until more research on the influence of nicotine during pregnancy is known, labeling on e-cigarettes, highlighting the dangers of use during pregnancy, should be implemented (Baeza-Loya et al., 2014).

The Prevalence of Electronic Cigarettes Use

There are four categories of potential electronic cigarettes consumers (vapers): tobacco smokers who want to quit smoking and consume e-cigarettes as a smoking cessation aid; cigarette smokers who want to smoke in public places; smokers who want a safer alternative to traditional cigarette smoking; and those who want to decrease the financial cost of cigarette smoking (Goniewicz, Lingas & Hajek, 2013).

In the US, approximately 20% of the young people in the 15-19 years age group are smokers and more than 43 million adults are addicted to tobacco smoking, however, 74% of them want to quit smoking. That being said, more than 32 million adult smokers have the potential to refrain from tobacco smoking (Mantler, 2012; Marlow, 2014). In 2012, current tobacco smokers were more prone to consume e-cigarettes than non-smokers, while 76% of e-cigarette users reported smoking tobacco as well. Furthermore, the dual users of e-cigarettes and tobacco cigarettes are found to consume e-cigarettes and other smokeless tobacco products as an alternative for tobacco cigarettes in free smoking environments. However, the non-smokers who never tried electronic cigarettes appeared less interested in e-cigarettes than current smokers (Czoli et al., 2014; Cataldo et al., 2015; Kalkhoran, Grana, Neilands & Ling, 2015).

Female tobacco smokers showed higher smoking cessation attempt rates than males, but with poor successful outcomes. Indeed, the peak use of electronic cigarettes was found to be higher in the male population aged between 30 and 50 (Morrell et al., 2008; Rahman et al., 2014). On the other hand, another set of data from the National Adult Tobacco Survey in the US showed that e-cigarette consumption is more common among young adults aged between 18 and 24 years (8.3 %) than the adult population as a whole (4.2 %) (Sutfin et al., 2015). Furthermore, Pokhrel & Herzog (2015) revealed that the younger, higher income and less nicotine-dependent tobacco

smokers showed better results, in terms of their successful attempts to quit tobacco smoking after using electronic cigarettes. In the UK, current tobacco smokers who consume e-cigarettes increased from 2.7 % in 2010 to 6.7 % in 2012, while the market revenues from e-cigarettes amounted to £193 million in 2013, increasing to £340 million in 2015 (Cope, 2014; Cataldo et al., 2015).

Tobacco smokers have identified numerous reasons for quitting smoking, with poor health being the main concern that led them to choose e-cigarettes as their smoking cessation method instead of nicotine replacement therapy (NRT) (Pokhrel & Herzog, 2014). The two issues surrounding the use of e-cigarettes as a smoking cessation aid are: whether the smokers consume them to quit tobacco smoking or for other reasons; and whether they are an effective tool in the quest to quit. However, a large proportion of e-cigarette users claim that they use it to quit tobacco cigarettes rather than using them for a recreational purpose (Rahman et al., 2014). The converted users from tobacco cigarettes to e-cigarettes revealed further dimensions about their purposes in consuming e-cigarettes instead of tobacco. The reasons include that cigarette smoking generates a bad smell and is less cost-effective than using e-cigarettes. Thus, it has been found that many consumers of e-cigarettes have abandoned the use of tobacco cigarettes but still continue consuming e-cigarettes (Pokhrel & Herzog, 2014).

In tobacco smokers who are unable to completely refrain from tobacco smoking, e-cigarettes showed good promise, with 31% of smokers having quit tobacco after six months of consuming e-cigarettes, and 50% of current smokers stating that e-cigarettes helped them refrain from using tobacco. Other studies have explored the reductions in the number of tobacco cigarettes used among dual users, with 92% of ex-smokers declaring that e-cigarettes helped them decrease their daily tobacco consumption. In another study, 67% of smokers acknowledged that they

reduced the number of cigarettes smoked every day, while a different study concluded that 23% of dual users reduced their tobacco smoking by more than half (Rahman et al., 2014). However, Manzoli et al. (2015) found that dual users were less able to refrain from tobacco cigarettes and they shared the same outcomes. On the other hand, the consumers of e-cigarettes only were able to maintain abstinence from tobacco for the whole time frame of the study (12 months).

Different regulatory restrictions apply to the promotion and marketing of electronic cigarettes all over the world. Canada and Australia have banned the use of e-cigarettes, in spite of the legal use of e-cigarettes in Romania, New Zealand and Poland (Bullen, 2013; Goniewicz et al., 2013; Lotrean, 2015). In Europe, there are around 15 consumer protection regulations that apply to the use of electronic cigarettes, for example product safety classifications, electrical safety, package labeling, chemical safety, commercial price and weight measures (Goniewicz et al., 2014).

In the state of Kentucky, e-cigarettes were rapidly available as part of its community free smoking policy, and indeed, there were more than four tobacco stores selling e-cigarettes for every 10,000 residents (Hahn et al., 2015). Parents or guardians who smoke have a huge impact on their children's behaviors and are considered a strong predictor of accessing electronic cigarettes. Friends also influence and encourage children to use e-cigarettes; two separate studies explored the relationship between children's behaviors and their access to electronic cigarettes. The results showed how involvements in risky behaviors such as tobacco smoking and alcohol consumption lead to the access of e-cigarettes (Lotrean, 2015; Hughes et al., 2015).

The Awareness & Beliefs of Electronic Cigarettes

Data on electronic cigarettes awareness are limited, however, such awareness doubled, from 16% to 32% from 2009 to 2010 (King et al., 2013). Subsequently, King et al. (2013) observed

an increase in awareness from 40% to 57% from 2010 to 2011 in a Web survey. While the awareness level was similar in both male and female, it was low among less well educated people and high among tobacco smokers. Three quarters (75%) of US residents are aware of e-cigarettes. Furthermore, 90% of the current tobacco smokers have heard of e-cigarettes (Zhu et al., 2013). In Australia, awareness of e-cigarettes increased from 20% to 66% from 2010 to 2013, while in 2013 the awareness was 88% in Netherlands and 34% in China (Gravely et al., 2014). Interpersonal communication and the Internet were the most common sources in terms of access and exposure to electronic cigarettes (Pepper, Emery, Ribisl & Brewer, 2014).

The sharp increase in the use of e-cigarettes has given rise to several concerns and queries about the safety and the effect of e-cigarettes in terms of the toxicity level of the nicotine solution, as well as their possible harm to other organs beyond the lungs (Rahman et al., 2014). In studying electronic cigarette awareness during pregnancy, the findings revealed that e-cigarettes are perceived as less addictive and harmful than combustible tobacco cigarettes, which may lead women to shift to e-cigarettes as an alternative to tobacco cigarettes during pregnancy (Baeza-Loya et al., 2014). High school students who participated in the 2012 National Youth Tobacco Survey (NYTS) have stated that compared to tobacco cigarettes, e-cigarettes are safer and may be associated with less risk of heart disease, lung and oral cancer (Chaffee et al., 2015). Moreover, several electronic cigarette consumers disclosed positive improvements in their health after switching from tobacco cigarettes to e-cigarettes in terms of having: better physical fitness, less coughing and enhanced breathing (Goniewicz et al., 2013; Czoli et al., 2014).

Among e-cigarettes consumers, most of the responders believe that the e-cigarettes are effective smoking cessation tools and can help smokers refrain from tobacco products (Czoli et al., 2014). Polosa (2015) surveyed three COPD tobacco smokers who switched to e-cigarettes, in

which they declared positive improvements in their quality of life and lower rate of disease exacerbations, with no certain side effects. Polytobacco consumers (cigarettes' consumers and alternative tobacco products' consumers) considered e-cigarettes as a safer alternative than other tobacco products because of their perception of this tool as a tobacco cessation aid or as more acceptable than the traditional tobacco cigarettes, in smoking-restricted areas (Latimer et al., 2014).

It is reported that current tobacco smokers believe that the government will not permit the product if it is harmful, and about 40% of the study sample think that the government evaluates e-cigarette safety (Latimer, Batanova & Loukas, 2014). The main claim made for e-cigarettes is that they help heavy tobacco smokers, who are unable to be helped by other means, to quit smoking (Al-Delaimy, Myers, Leas, Strong & Hofstetter, 2015). Older adult tobacco smokers are skeptical about the safety and effectiveness of the e-cigarette as a smoking cessation device, and this perception mirrors the fact that their smoking behavior started before the inception of e-cigarettes (Cataldo et al., 2015).

Little information is known about young adult perceptions concerning e-cigarettes. However, the data collected in 2013 showed that they are more aware of e-cigarettes than other age groups. Their beliefs asserted that e-cigarettes are more effective in helping smokers stop smoking, less additive than tobacco products and safer than traditional combustible cigarettes (Choi & Forster, 2013). Proper insight into adolescent awareness of certain tobacco products can lead to the implementation of prevention programs against the use of such products. Misconceptions about e-cigarettes may lead to product abuse, and adolescent use, which could become entangled with the possible anti-tobacco benefits from e-cigarettes (Chaffee et al., 2015). Indeed, the awareness of e-cigarettes has sharply increased in the last few years, but we do not

know how accurate and correct the information about e-cigarette perception is (Pepper et al., 2014).

Electronic Cigarettes Among Students

Few researchers have investigated the prevalence of e-cigarette use in subpopulations. In Korea, the consumption rate of e-cigarette users, aged from 13 to 18 years, increased to 9% in 2011; and 7% of Polish high school and college students used e-cigarettes (Dockrell et al., 2013). In France, 8% of school students aged from 12 to 19 years had tried e-cigarettes in 2012. In the UK, 5% of school students aged from 11 to 18 years who had heard of e-cigarettes, have tried them in 2013 (Hughes et al., 2015).

The current studies on the prevalence of electronic cigarettes' use among college students are limited. Indeed, college students are an important cluster to investigate because they are in a vulnerable period of their life and the tobacco industry targets this age group. Young adulthood is one of life's transition periods which brings stress. Hence, young adults' consumption of e-cigarettes are more likely to be tobacco smokers, which is a predictor of the use of e-cigarettes (Sutfin et al., 2015). The conducted studies about the smoking behaviors among healthcare students are narrow and limited. It is preferable for all healthcare specialists to be non-smokers because it is less likely for a smoker's patients to obey a smoking cessation regime if the healthcare provider is a smoker. The tobacco smoking prevalence rate among healthcare providers in the U.S., Brazil and the U.K. is less than that of their general population. On the other hand, the healthcare provider rate is higher in Spain, Japan, Saudi Arabia, Hungary and Italy (Morrell, Cohen & Dempsey, 2008). Ultimately, due to the marketing increase in alternative tobacco products among college students, it is important to explore how e-cigarettes are used within this population group (Latimer, Batanova & Loukas, 2014; Sutfin et al., 2015).

Due to the increase in advertisements for, and the marketing of, e-cigarettes and other alternative tobacco products to the college-aged population, it is essential to study individuals' perceptions about such products (Latimer et al., 2014). Whereas the tobacco smoking rate is dropping among the US' high school students, the use of e-cigarettes is increasing, with only vague answers about the health outcomes of this product among the youth (Chaffee et al., 2015). The data from the 2014 National Youth Tobacco Survey reveal that electronic cigarette consume (at least once daily in the last month) among middle school students tripled from 1.1% in 2013 to 3.9% in 2014 from approximately 120,000 to 450,000 students. The percentage of use among high school students increased from 4.5% in 2013 to 13.4% in 2014 from approximately 660,000 to 2 million students (CDC, 2015). In the U.S., an online survey of college students discovered that 71% of students are aware of e-cigarettes, and the awareness of this product is associated with higher acceptance of using it in public places, than is the case with tobacco smoking (Trumbo & Harper, 2013).

In Romania, e-cigarettes are legal to use without any restrictions, and university students revealed high awareness of this product, with frequent use of e-cigarettes among tobacco smokers (Lotrean, 2015). In Italy, medical students' knowledge about the epidemiological ratio of tobacco use is restricted. The teaching methods are focused on tobacco-related diseases rather than smoking cessation support, therefore, medical schools should include smoking cessation knowledge to help patients stop smoking (Grassi et al., 2012). It is important to increase perception about tobacco cessation in medical schools to improve awareness and impede the adoption of smoking among students (Bartwal, Awasthi, Rawat & Arya, 2014).

Summary

The marketing of e-cigarettes is continuing to spread among middle-aged tobacco smokers (Rahman et al., 2014). The use of e-cigarettes provides an alternative method to tobacco smokers to quit the use of tobacco products (Pokhrel & Herzog, 2014). Since 2011, the consumption of e-cigarettes has shown an increase among US adults, and this is expected to continue to rise in the future and could have implications for the health outcomes of consumers (King et al., 2013. The current knowledge about electronic cigarettes use among college students is limited, and young adults are being targeted by the tobacco industry because of their vulnerability in terms of trying new and novel products. It is essential to study how e-cigarettes are used among this group and to explore the public health influence of this alternative tobacco product (Sutfin et al., 2015).

Chapter III

Methods

This chapter will present the methods used to answer the following research questions:

1- What was the prevalence of e-cigarettes exposure among the college-based health care students?

2- What was the awareness of e-cigarettes among the college-based health care students?

3- What are the beliefs of the college-based health care students about the use of e-cigarettes?

4- What were the socio-demographic factors that influenced the prevalence of use, awareness and beliefs of e-cigarettes among the college-based health care students?

Instrumentation

The questionnaire that was used in this research was developed by Dr. Lotrean (2015) to assess students' beliefs, use, and exposure to e-cigarettes by their friends, parents, and siblings. In addition, the socio-demographic characteristics of gender and age of the participants were considered. Permission from the author was obtained to use this questionnaire for this research which examines the prevalence of use, and beliefs in terms of e-cigarettes among health care students (Appendix A). The awareness questions were developed from the literature review by the author of this thesis, Mr. Abdullah Alanazi. Face validity was performed on the awareness questions by a panel of respiratory therapy, education and public health faculty members by critically reviewing suggestions regarding content, wording, and format.

The survey instrument was composed of two sections: the instrument section and the socio-demographic characteristics section (Appendix B). The first section measures the students' prevalence of use, awareness, and beliefs by dividing the questionnaire into three subscales (awareness, prevalence of use, and beliefs). The second section asked socio-demographic

characteristics composed of "fill in the blank" and circled items to address gender (male/female), age, smoking behavior (smoker/former smoker/non-smoker), academic level (first year/second year), and the nature of the profession (respiratory therapy/nursing/nutrition).

Sample

The accessible population for this research was a convenient sample, chosen based on the availability of the participants. The criteria for this research included: all on-campus undergraduate Bachelor's degree students in six classes of first and second year respiratory therapy, nursing, and nutrition programs. The criteria that was excluded from this research included all other on-campus degree students, such as students who were studying for a PhD, an integrated Master's degree, a traditional Master's degree, bridge, associate, a diploma, and those studying on a distance learning basis (hybrid or online). The response rate was 98.1% (n=217) from all six classes' students (n=221).

Research design

This was a descriptive, exploratory, cross-sectional research with a self-reporting questionnaire. The researcher distributed the questionnaire to the students himself to avoid any bias between all the different six classes of the first and second year classes of undergraduate respiratory therapy, nursing, and nutrition students at the end of the class (without the presence of the class professor).

Protection of Human Subjects

The research plan was submitted to Georgia State University Institutional Review Board (IRB) and students' rights were protected at all times. No names were used during the data

collection and no risks were perceived for participation in this research. Data confidentiality was ensured.

Invitation Letter

An invitation letter (Appendix C) was written to invite students to participate. It was developed after reviewing several writing styles and thesis committee adjustments. The invitation letter was sent by an e-mail to each class member a week before data collection.

Informed Consent

The informed consent was attached to the questionnaire at the day of data collections. Students were advised by the researcher himself to read the informed consent then sign their agreement or disagreement to participate. If agreed to participate, students were advised to answer the questionnaire. If disagreed to participate, the students were advised to leave the questionnaire blank (Appendix D).

Data collection

The researcher distributed the questionnaire to the students at the end of their class, without the presence of the class professor. Before data collection, the researcher clarified the purpose of the research, emphasized that participation was strictly voluntary, and that all students had the right to refuse to participate or withdraw from participation at any time thereof. The researcher himself distributed the questionnaire packets, each of which was composed of an informed consent and the instrument questionnaire. No identification data were requested during data collection to ensure confidential participation and anonymity of the students. The researcher himself collected the data after the students completed the questionnaire.

Data Analysis

Data was analyzed by using the statistical program Statistical Package for the Social Sciences (SPSS) version 22. The mean, standard deviation, frequency, and percentage were computed to find the prevalence of use, awareness and beliefs of e-cigarettes. The variance analysis of one-way ANOVA was calculated among different smoking behaviors (smoker, former smoker and non-smoker), different health professions (nursing, nutrition and respiratory therapy), and different age groups (19-25, 26-30, 31-35, 36-40, and +40). The variance analysis of Independent *t*-Test between different genders (male and female) and different educational levels (first year and second year) were used. The variance analysis was significant at $p < 0.05$. The survey consisted of 17 questions subcategorized in three sections; prevalence of use; awareness; and beliefs. The Cronbach's alpha for internal reliability test was performed on all survey questions ($\alpha = 0.60$).

Measurements of data

The prevalence of e-cigarettes use was measured by descriptive analysis of frequency and percentage. The awareness of e-cigarettes was calculated by descriptive analysis of frequency, percentage, mean score (0 being the lowest and 8 being the highest) and standard deviations. The belief questions were consolidated from totally agree, somewhat agree, neutral, somewhat disagree, and totally disagree to agree, neutral and disagree. The purpose of this consolidation was to gain general conclusions about the college-based health care students' beliefs of e-cigarettes, before descriptive analysis of frequency and percentage were measured.

Summary

This chapter included the sample population, the procedure for data collection, and the methods of data analysis. This study aimed to measure the prevalence of use, awareness, and beliefs in terms of college-based health care students from on-campus undergraduate Bachelor's

degree students from six classes of first and second year respiratory therapy, nursing, and nutrition professional studies.

Chapter IV

Findings

The purpose of this chapter was to explore the awareness and the prevalence of use of electronic cigarettes, and also the beliefs of e-cigarettes use among undergraduate health care professional students. Demographic information and results of the statistical analyses are presented in this chapter.

The research was intended to answer the following questions:

1- What was the prevalence of e-cigarettes exposure among the college-based health care students?

2- What was the awareness of e-cigarettes among the college-based health care students?

3- What are the beliefs of the college-based health care students about the use of e-cigarettes?

4- What were the socio-demographic factors that influenced the prevalence of use, awareness and beliefs of e-cigarettes among the college-based health care students?

Description of Sample

The study was conducted in a southeastern urban university, where six classes at the college of nursing and health professions were selected to participate in this study. The total number of students from the first year and second year respiratory therapy, nursing and nutrition programs was 221, whereby 217 students voluntarily participated in this study (response rate 98.1%). The majority of the respondents were nursing students (n= 103, 47.5%); followed by nutrition students (n= 64, 29.5%); and respiratory therapy students (n= 50, 23%). Female respondents composed of 189 (87.1%) and male respondents were 28 (12.9%). Most of the respondents self-declared as non-smokers (n=181, 83.4%); followed by former smokers (n= 30, 13.8%); and smoker respondents (n= 6, 2.8%) (As shown in Table 1).

Table 1. Demographic data of participants

Characteristics	n (%)
Gender	
Male	28 (12.9%)
Female	189 (87.1%)
Year of study	
First-year	129 (59.4%)
Second-year	88 (40.6%)
Education program	
Nursing	103 (47.5%)
Nutrition	64 (29.5%)
Respiratory therapy	50 (23%)
Age	
19-25	152 (70%)
26-30	33 (15.2%)
31-35	16 (7.4%)
36-40	5 (2.3%)
40+	11 (5.1%)
Smoking behavior	
Smoker	6 (2.8%)
Former smoker	30 (13.8%)
Never smoked	181 (83.4%)

n= 217

The Prevalence of Electronic Cigarettes Exposure

The first research question was intended to calculate the prevalence of electronic cigarettes use among the college-based health care students. The results showed that the vast majority (n=171, 78.8%) have never used e-cigarettes during their lifetime. Non-smokers were 22 (47.8%) of the responders who have tried e-cigarette in their lifetime, whereas former smokers were 20 (43.5%) and smokers were 4 (8.7%). Most of the responders who tried e-cigarettes reported that curiosity was the main reason for trying e-cigarettes (See Table 2).

The majority of the respondents have no intention to use electronic cigarettes in the next year (n= 205, 94.5%). The respondents indicated that most of them have friends who have tried

e-cigarettes (n= 127, 58.5%). Moreover, most of the respondents who have tried e-cigarettes in their lifetime have friends who also have tried e-cigarettes (n= 44, 95.7%). The vast majority of respondents have reported that they have parents and siblings who have not tried e-cigarettes. (See Table 2).

Table 2. Electronic cigarettes exposure

Questions	n (%)
I have used e-cigarettes at least once during my lifetime	
Yes	46 (21.2%)
Neutral	0 (0%)
No	171 (78.8%)
I have used e-cigarettes in the last month	
Yes	8 (3.7%)
Neutral	1 (0.5%)
No	208 (95.9%)
I intend to use e-cigarettes in the next year	
Yes	5 (2.3%)
Neutral	7 (3.2%)
No	205 (94.5%)
I have friends who have tried e-cigarettes	
Yes	127 (58.5%)
Neutral	7 (3.2%)
No	83 (38.2%)
I have parents who have tried e-cigarettes	
Yes	24 (11.1%)
Neutral	1 (0.5%)
No	192 (88.5%)
I have siblings who have tried e-cigarettes	
Yes	28 (12.9)
Neutral	9 (4.1%)
No	180 (82.9%)

n= 217

The Awareness of Electronic Cigarettes

The second research question was aimed to explore the awareness of the electronic cigarettes among college-based health care students. Almost all the respondents have heard of e-cigarettes (n= 216, 99.5%) and that e-cigarettes are nicotine delivery appliances which vaporize

nicotine. Most respondents were aware that e-cigarettes can be inhaled with different additives and flavors. However, respondents were not aware that there is no combustion involved with the use of e-cigarettes and no carbon monoxide resulted from the use of e-cigarettes. The majority of respondents were also not aware that e-cigarettes are not regulated by the FDA (See Table 3).

Table 3. Awareness of electronic cigarettes' properties

Questions	n (%)
Have you heard of electronic cigarettes (E-cigarette)?	
Yes	216 (99.5%)
No	1 (0.5%)
Are you aware that an e-cigarette is nicotine delivery system?	
Yes	178 (82%).
No	39 (18%)
Are you aware that an e-cigarette is an appliance that vaporizes nicotine?	
Yes	165 (76%)
No	52 (24%)
Are you aware that an e-cigarette can be inhaled with different additives (i.e. Nicotine)?	
Yes	151 (69.6%)
No	66 (30.4%)
Are you aware that an e-cigarette can be inhaled with different flavors (i.e. Peach)?	
Yes	193 (88.9%)
No	24 (11.1%)
Are you aware that there is no combustion is in an e-cigarette?	
Yes	86 (39.6%)
No	131 (60.4%)
Are you aware that there is no carbon monoxide is in an e-cigarette?	
Yes	53 (24.4%)
No	164 (75.6%)
Are you aware that an e-cigarette is not currently regulated by Food and Drug Administration (FDA)?	
Yes	69 (31.8%)
No	148 (68.2%)
Mean±SD	**5.1±0.11**

n= 217

The respondents over 40 years showed the highest mean awareness score of 6.0 (SD 1.73), and students of first year and second year showed close mean awareness score (5.08±1.61 vs. 5.17±1.61). The nutrition students revealed the highest mean awareness score of 5.34 (SD

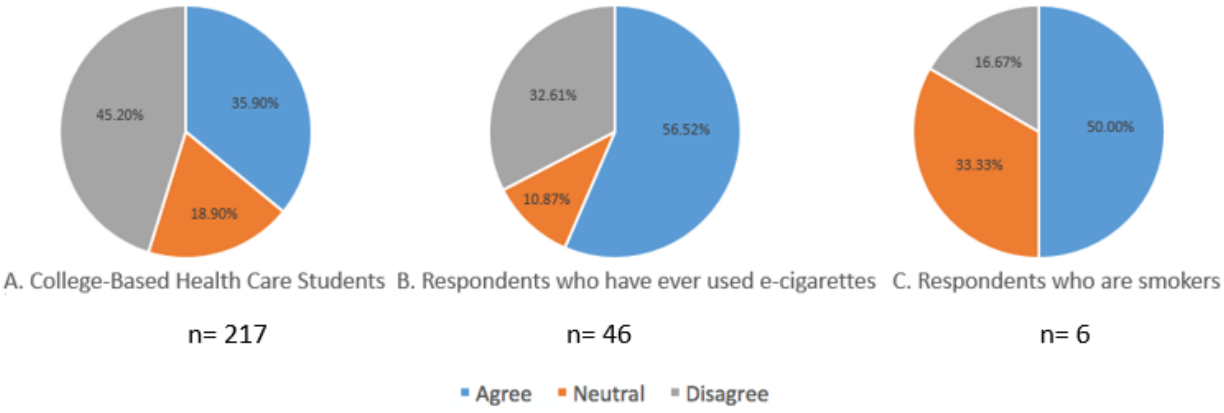
1.69); followed by respiratory therapy (5.30±1.59); and nursing (4.89±1.73). The respondents who smoke showed the highest mean awareness score of 6.0 (SD 2.28); followed by former smokers (5.86± 1.27); and non-smokers (4.96±1.70). The respondents who tried e-cigarette at least once during their lifetime showed higher mean awareness score than who have never tried e-cigarettes (5.63±1.49 vs. 4.98±1.72)

The Beliefs about the Use of the Electronic Cigarettes

The third question was about the beliefs of college-based health care students in regard to the use of e-cigarettes. In order to gain any general conclusions about the students' beliefs, the answers were consolidated to totally agree and somewhat agree into one answer (agree) as well as somewhat disagree and totally disagree into one answer (disagree). The analyzed three answers were agree, neutral and disagree.

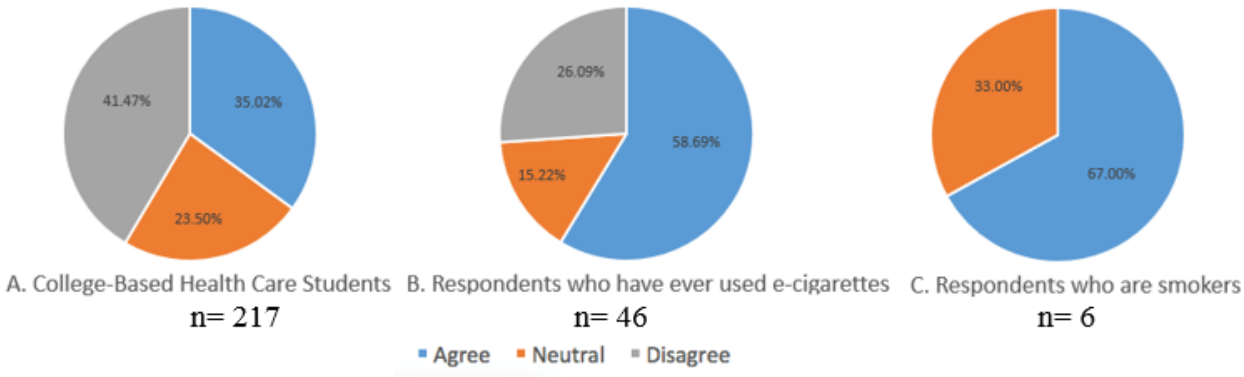
The 15th question of the survey regarding the beliefs of e-cigarettes being less dangerous than traditional cigarettes, almost half of the respondents disagreed (n=98, 54.1%). Some respondents (n=78, 35.9%) agreed that e-cigarettes are less dangerous than tobacco cigarettes (See Figure 1). More than of half of the respondents who have used e-cigarettes at least once in their lifetime (n=26, 56.5 %) agreed that e-cigarettes are less dangerous than tobacco cigarettes (See Figure 1), as well as the smokers of the respondents (n=3, 50%) (See Figure 1).

Figure 1. E-cigarettes are less dangerous than traditional cigarettes



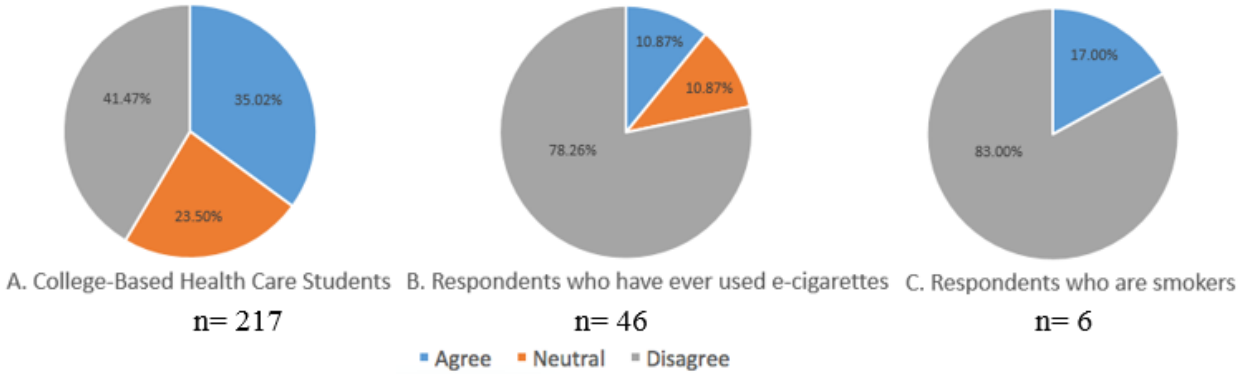
Additionally, the 16th question of the survey regarding the beliefs of E-cigarettes can help smokers to quit, most respondents disagreed that e-cigarettes help smokers to quit. There was no clear majority from the respondents (See Figure 2). More than half of the respondents who have tried e-cigarettes agreed that e-cigarettes can help smokers to quit (n= 26, 56.5%) (See Figure 2), and half of the smokers agreed on that as well (n= 3, 50%) (See Figure 2).

Figure 2. E-cigarettes can help smokers to quit



In question number 17 (E-cigarettes are used only by smokers), the majority of the respondents disagreed (n= 138, 63.5%) and respondents who agreed composed of 42 (19.3%) (See Figure 3). Most of the respondents who have used e-cigarettes disagreed on e-cigarettes are used only by smokers (n= 36, 78.3) (See Figure 3), as well as the smokers (n= 5, 83.3%) (See Figure 3).

Figure 3. E-cigarettes are used only by smokers



Socio-demographic factors that influence prevalence of use, awareness and beliefs

The forth research question was about the social and demographic factors that influence the prevalence of e-cigarettes use, the awareness level of e-cigarettes and the beliefs in regards to e-cigarettes use among the college based health care students. These factors were gender (Male and Female), educational level (First year and Second year), ages (19-25, 26-30, 31-35, 36-40, and +40), educational professions (Nursing, Nutrition and Respiratory Therapy), smoking behaviors (Smoker, Former smoker and Non-smoker).

The awareness level was significantly different among male respondents (5.71±1.51) and female respondents (5.03±1.71) with p= 0.047. The awareness level was statistically significant different among respondents who have ever used e-cigarettes (5.63±1.49) than respondents who have not tried e-cigarettes at least once during their lifetime (4.98±1.72) with p= 0.021. Moreover, the awareness level was significantly different among respondents who have friends that have tried e-cigarettes (5.65±1.41) than respondents who do not have friends tried e-cigarettes (4.31±1.80) with p= 0.000. Respondents who have parents who have tried e-cigarettes have significant different awareness level (5.87±1.11) than respondents that their parents who have not tried e-cigarettes (5.01±1.73) with p= 0.019. There were no significant differences among different age groups,

smoking behaviors, educational levels and educational professions of college-based health care students in regard to the awareness level of e-cigarettes.

There was a significant difference in the belief that e-cigarettes are less dangerous than traditional cigarettes among males (2.42±1.70) and female (3.29±1.78) with p= 0.017. Respondents who have tried e-cigarettes at least once during their lifetime showed significant differences in regard to beliefs of e-cigarettes use than respondents who have not used e-cigarettes at least once during their lifetime. These beliefs are as follows: e-cigarettes are less dangerous than traditional cigarettes (2.52±1.84 vs. 3.36±1.74, p= 0.005), e-cigarettes can help smokers to quit (2.34±1.74 vs. 3.33±1.69, p= 0.001) and e-cigarettes are used only by smokers (4.34±1.33 vs. 3.76±4.63, p= 0.026).

Respondents who have intentions to use e-cigarettes in the next year declared significant differences in the beliefs of use e-cigarettes than respondents who have no intention to use e-cigarettes in the next year. These beliefs are as follows: E-cigarettes are less dangerous than traditional cigarettes (1.00±0.00 vs. 3.28±1.77, p= 0.005) and E-cigarettes can help smokers to quit (1.00±0.00 vs. 3.21±1.73, p= 0.005). Respondents who have friends who have tried e-cigarettes showed significant differences when compared to respondents who do not have friends have tried e-cigarettes regarding the belief that e-cigarettes are used only by smokers (4.05±1.50 vs. 3.53±1.71, p= 0.02). There were no other significant differences among age groups, smoking behaviors, educational levels and educational professions of college-based health care students in comparing the beliefs of e-cigarettes use.

There were no significant differences found for gender (Male and Female), educational level (First year and Second year), ages (19-25, 26-30, 31-35, 36-40, and +40), educational professions (Nursing, Nutrition and Respiratory Therapy), smoking behaviors (Smoker, Former

smoker and Non-smoker), prevalence of e-cigarettes use and for exposure among college-based health care students.

Summary

The majority of the respondents reported themselves as never having tried e-cigarettes and reported a higher prevalence of use among their friends. The awareness level of e-cigarettes was high among those who have tried e-cigarettes and smokers. This was found to be similar among first year and second year students. There was general disagreement on the use of e-cigarettes as being a less dangerous method for smokers who are trying to quit tobacco products. Finally, respondents who used e-cigarettes or have friends who have tried e-cigarettes showed significant differences than respondents that have not tried e-cigarettes or have friends who have tried e-cigarettes in regard to the level of awareness and beliefs of use e-cigarettes.

Chapter V

Discussion

This chapter explored the findings of the research questions, any implications for practice, recommendations for future research, any limitations of the study, and find conclusions. The research questions that were investigated in the discussion were:

1- What was the prevalence of e-cigarettes exposure among the college-based health care students?

2- What was the awareness of e-cigarettes among the college-based health care students?

3- What are the beliefs of the college-based health care students about the use of e-cigarettes?

4- What were the socio-demographic factors that influenced the prevalence of use, awareness and beliefs of e-cigarettes among the college-based health care students?

Findings Related to Question 1

The first research question asked about the exposure of the e-cigarettes among the college-based health care students which revealed that the majority of the students have never tried e-cigarettes. This finding was consistent with a Romanian study that found two quarters of their students have never tried e-cigarettes as well (Lotrean, 2015). The majority of the college-based health care students reported no intension to use e-cigarettes in the next year as similar to what Lotrean (2015) reported in her study among the Romanian students.

Almost half of the respondents in this study reported having tried e-cigarettes at least once in their life were non-smokers which was not consistent with other studies. Lotrean (2015) found more than half of the university students who have tired e-cigarettes were smokers. Another study declared that 76% of the e-cigarette users were tobacco smokers as well (Cataldo et al., 2015). The tobacco smoking prevalence rate among health care providers in the U.S is less than that of the

general population (Morrell et al., 2008). This is a potential explanation of why the college-based health care students have low rates of tobacco and e-cigarette consumptions.

College-based health care students in this study who have tried e-cigarettes reported that curiosity in the main reason for them to try e-cigarettes. Lotrean (2015) reported similar results where curiosity and friends' influence being the main reasons for the Romanian university students that led them to try e-cigarettes. On the other hand, Rahman et al., (2014) reported in a systemic review that a large proportion of e-cigarette and tobacco cigarette consumers claimed that they use e-cigarette to quit tobacco rather than other reasons.

For this study, more than three-quarters of the college-based health care students who have tried e-cigarettes were aged between 19-25 years, which is consistent with what Sutfin et al (2015) was reported that e-cigarette consumption is more common among US young adults, ages 18 to 24 years. College-based health care students reported that a high percentage of their friends have tried e-cigarettes (58.5%) and low parents' experience with e-cigarettes (11.1%), similar to Lotrean (2015) who showed in her study that 60% of the study sample declared having friends who had experienced e-cigarettes and 6.3% of the students' parents who had experimented with e-cigarettes.

Findings Related to Question 2

The second research question explored the awareness of e-cigarettes among these college-based health care students. Almost all the students had heard about e-cigarettes (99.5%). This is consisted with Lotrean (2015) who reported that 92.5% of the university students had heard of e-cigarettes, and also Trumbo & Harper (2013) indicated that 71% of the college students were aware of e-cigarettes as well. All the smokers and former smokers have heard about electronic cigarettes among the college-based health care students; Lotrean (2015) indicated that 95% of the smokers

and 96% of the former smokers have heard about e-cigarettes among the university students; Zhu et al (2013) found that 90% of the current tobacco smokers have heard about e-cigarettes too.

There are unique findings of this study that assess the e-cigarettes' awareness from different components (device, content and regulation); these findings were obtained from questions created from the literature. The majority of the college-based health care students are aware that e-cigarettes are nicotine delivery systems vaporize nicotine. Moreover, the students were aware that e-cigarettes can be inhaled with different additives and flavors. However, the majority of the college-based health care students were not aware that there are no carbon monoxide and combustion in e-cigarettes. The e-cigarettes' awareness in matter of regulation was low as well; the majority of the students were not aware that e-cigarettes are currently not regulated by the Food and Drug Administration (FDA).

The mean score of the awareness questions showed that the awareness level was the highest among the students who are more than 40 years of age. The mean awareness scores between first year and second year were similar, as well as respiratory therapy students and nutrition students, whereas nursing students showed lower awareness level than others.

King et al., (2013) found that the awareness level was high among tobacco smokers; this finding was similar to what this study found whereby the smokers' awareness level was the highest score among the former smokers and non-smokers.

Findings Related to Question 3

The third research question was found to investigate the college-based health care students' beliefs about the use of e-cigarettes. The majority of the students believe that e-cigarettes are not less dangerous than traditional cigarettes, and that e-cigarettes cannot help smokers to quit. Their use is not exclusive to smokers only. In contrast, Lotrean (2015) showed that half of the university

students believed that e-cigarettes were less dangerous than tobacco cigarettes; two-thirds believed that e-cigarettes can help smokers to quit tobacco cigarettes; and half of the students believed that e-cigarettes' use were exclusive on smokers only. Additionally, Choi & Forster (2013) reported that young adults perceived e-cigarettes as safer products than combustible cigarettes and more effective in helping smokers to quit tobacco cigarettes.

The smokers and e-cigarette users among the college-based health care students believe that e-cigarettes are less dangerous than traditional cigarettes; that e-cigarettes can help smokers to quit tobacco cigarettes; and that e-cigarettes are not used by smokers only. This was similar to what Czoli et al., (2014) also reported that e-cigarettes consumers believe that e-cigarettes are an effective smoking cessation tool and can help smokers quit tobacco cigarettes.

Findings Related to Question 4

Gender was a significant factor that represented differences in regards to the awareness level and beliefs of e-cigarettes use. Male respondents showed a significant higher awareness level than female respondents which was against the findings of King et al., (2013) who found similar awareness between male and female participants.

Respondents who have used e-cigarettes at least once in their lifetime showed significant differences than respondents who have not tried e-cigarettes in regards to the awareness and beliefs of e-cigarettes use. As well, the respondents who have friends who have tried e-cigarettes reported different awareness levels and beliefs in regard to the use of e-cigarettes than respondents who do not have friends who have tried e-cigarettes.

Implications for Practice

The findings of this study highlight the prevalence of e-cigarettes' use, awareness and beliefs among the college-based health care students. This is a unique study that reveals the different aspects of e-cigarette use among the college-based health care professions and will contribute to the literature by adding the perceptions of e-cigarettes for the upcoming health care providers. This study provides information about e-cigarettes' usage patterns and the leading factors for e-cigarettes experimentations among college-based health care students such as family, friends and smoking behaviors.

Since health care students will have an impact on their patients in the future, addressing the e-cigarette issues of use in the health care programs are needed. Training programs on the tobacco cessation tools and alternative tobacco products should be emphasized and provided to the health care students who may have significant influence on their nicotine-dependent patients. This study introduced an awareness assessment instrument that assesses the awareness of e-cigarettes' device, content and regulation components.

Limitations

The limitations of this study were highlighted by several factors. The sample was from one educational institution with limited educational degrees and professions. The sample size of 217 is considered a relatively small sample size in comparison to different public health studies that examine the public's e-cigarettes use. The make-up of the respondents do not allow for the analysis of data separately for gender (mostly female), educational programs (mostly nursing), or smoking behaviors (mostly non-smokers). Therefore, this study cannot be generalized to all college-based health care students. The adopted assessment instrument of prevalence of use and beliefs of e-cigarettes did not undergo any reliability and validity instrumentations before a face validity

procedure examined the contents by a panel of faculty members. The assessment instruments showed Cronbach's alpha for internal reliability test was performed on all survey questions (α= 0.60) which is considered low.

Recommendations for Future Study

The use of e-cigarette as an alternative nicotine delivery method is debatable and active research is ongoing to explore different issues about electronic cigarettes. Therefore, more research is needed among different subpopulations to examine the public concern of e-cigarette' use with a larger sample size. The replications of this study among different health care professions, health care providers, health care educators, and different educational degrees are strongly encouraged to have a wider vision about the e-cigarettes perception among the health care personnel. Refining the assessment instrument of this study is highly recommended to have more reliable conclusion on the prevalence of use, awareness and beliefs of e-cigarettes. Therefore, further validity and reliability assessments are highly recommended for the questionnaire.

Conclusion

To what is known, this was the first study that addressed the prevalence of use, awareness and beliefs of e-cigarettes among the health care students. The study revealed that most of the college-based health care students have never tried e-cigarettes but have friends who have tried it. The awareness level was high among students who smoke and uses e-cigarettes. Moreover, there was limited knowledge about the components of e-cigarettes, such as the fact that they have no carbon monoxide and combustion. The majority of college-based health care students do not believe that e-cigarettes are less dangerous than traditional cigarettes, that e-cigarettes can help smokers to quit and that e-cigarettes are used only by smokers. There were significant differences

among respondents who have tried e-cigarettes or have friends and parents who have tried e-cigarettes in regards to awareness level and beliefs of e-cigarettes use.

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Appendix A: Permission

RE: Use of Electronic Cigarettes among Romanian University Students Survey Permission

LL Lucia Lotrean <llotrean@umfcluj.ro>

To: Abdullah Mayof Alanazi; Cc: ltgoodfellow@gsu.edu;

Reply all

Tue 8/25/2015 7:03 AM

Inbox

You replied on 9/27/2015 12:07 AM.

Dear Abdulah,
You may use the survey used in my study.
The study was an exploratory one, we really wanted to get some information about what is is going on, since no other data were available at that time. Because of time and logistic constraints, no validity study was performed.

Please let me know if I can be of any other help.

Kind regards,
Lucia Lotrean

Appendix B: Instrument Survey and Demographics

Part 1: The survey instrument

Section 1: The awareness of e-cigarettes. Use the following scale of Yes or No to answer this section**:**

Awareness	**Yes**	**No**
1. Have you heard of electronic cigarettes (E-cigarette)?		
2. Are you aware that an e-cigarettes is nicotine delivery system?		
3. Are you aware that an e-cigarette is an appliance vaporizes nicotine?		
4. Are you aware that an e-cigarette can be inhaled with different additives (i.e. Nicotine)?		
5. Are you aware that an e-cigarette can be inhaled with different flavors (i.e. Peach)?		
6. Are you aware that there is no combustion is in an e-cigarette?		
7. Are you aware that there is no carbon monoxide is in an e-cigarette?		
8. Are you aware that an e-cigarette is not currently regulated by Food and Drug Administration (FDA)?		

Section 2: The prevalence of use of the e-cigarette. Use the following scale of Yes, Neutral and No to answer this section:

Prevalence of Use	**Yes**	**Neutral**	**No**
9. I have used e-cigarettes at least once during my lifetime			
10. I have used e-cigarettes in the last month			
11. I intend to use e-cigarettes in the next year			
12. I have friends who have tried e-cigarettes			
13. I have parents who have tried e-cigarettes			
14. I have siblings who have tried e-cigarettes			

Section 3: The beliefs in regard of e-cigarette. Use the following scale of Totally agree, somewhat agree, Neutral, somewhat disagree and totally disagree.

Beliefs	I totally agree	I somewhat agree	Neutral	I somewhat disagree	I totally disagree
15. E-cigarettes are less dangerous than traditional cigarette					
16. E-cigarettes can help smokers to quit					
17. E-cigarettes are used only by smokers					

Part 2: Demographic Questionnaire

Please circle the appropriate number or fill in where requested:

Education:

Year/level in program:

- First year (junior)
- Second year (senior)

Educational profession:

- Nursing
- Nutrition
- Respiratory Therapy

Age:

- 19-25 years
- 26-30 years
- 31-35 years
- 36- 40 years
- 41+ years

Gender:

- Male
- Female

Smoking behavior:

- Smoker
- Former smoker
- Never smoked (Non-Smoker)

If tobacco cigarette smoker:

- Number of tobacco cigarettes smoker/day:
  - Maximum 1 pack/day
  - More than 1 pack/day
- Do you have intention to quit tobacco cigarettes within the next year?
  - Yes
  - No

If e-cigarette user:

- The reasons for trying e-cigarette: (Circle all that apply)
  - E-cigarettes are less dangerous
  - To reduce the number of the traditional cigarettes
  - To quit smoking
  - Curiosity
  - Other friends also tried e-cigarette
  - Others (specify): ……..

Appendix C: Invitation Letter

Invitation Letter

Dear undergraduate students.

I am inviting you to participate in my research study "THE PREVALENCE OF USE, AWARENESS AND BELIEFS OF ELECTRONIC CIGARETTES AMONG COLLEGE-BASED HEALTH CARE STUDENTS AT A SOUTHEASTERN URBAN UNIVERSITY" The purpose of this study is to assess students' use, awareness and beliefs of the e-cigarettes. If you volunteer to participate, you will be asked to answer 17 questions related to the prevalence of use, awareness and beliefs about the e-cigarettes. These questions should take approximately 15 minutes of your time to answer. The student investigator Abdullah Alanazi shall give these surveys to you at your class time.

Your participation is strictly voluntary and you can refuse to participate or stop taking the survey at any time without penalty. Your answers will be confidential. In order to protect your confidentiality, no names or codes will be used to identify you or your survey. The findings will be summarized and reported in a group form. Your completion and submission of the survey indicate your consent to participate in the study. We hope that you will submit a completed survey. Although your participation in this study may not benefit you personally, we hope to gain information about the level of use, awareness and beliefs of the electronic cigarettes among the students at the college of nursing and health profession.

If you have any questions about this research study, please contact my advisor, Dr. Lynda Goodfellow at LTGoodfellow@gsu.edu or 404.413.1100.

Sincerely,

Abdullah Alanazi, BS, RRT-NPS
Graduate Student
Georgia State University
Byrdine F. Lewis School of Nursing and Health Professions
Division of Respiratory Therapy

Appendix D: Informed Consent

Georgia State university
Department of Respiratory Therapy
Informed Consent

Title: THE PREVALENCE OF USE, AWARENESS AND BELIEFS OF ELECTRONIC CIGARETTES AMONG COLLEGE-BASED HEALTH CARE STUDENTS AT A SOUTHEASTERN URBAN UNIVERSITY
Principle Investigator: Lynda T Goodfellow, Ed.D, RRT AE-C
Co-Investigator: Abdullah Alanazi, BS, RRT-NPS

Dear Students:

I am writing to request your participation in a research study. The specific aim is to address the prevalence of use, awareness and beliefs of e-cigarettes among the students in a college of nursing and health profession. You are invited to participate because you are a health care student in the college of nursing and health professions. All of students in the undergraduate program of respiratory therapy, nursing and nutrition will be recruited for this study. Participation will require about 15 minutes of your time during this semester.

If you decide to participate, you will complete this survey asking about the level of students' awareness of e-cigarettes, prevalence of using the e-cigarettes among the students, and the students' beliefs in regard the e-cigarettes. This survey will need to be completed one time only.

You will receive no direct benefit for volunteering to participate in this study. Overall, we hope to gain information about that may be beneficial in discerning the specific knowledge needed about the e-cigarettes. It will also provide information regarding your opinion on the use of e-cigarettes. This survey will not require you to interact with other participants.

Your participation in this study in absolutely voluntary and you can refuse to participate or stop to take the survey at any time without penalty or loss benefits to which you are otherwise entitled. Your response will be used for a research purposes and will be strictly confidential. Should you decide to participate you will be asked to complete the following survey, which should take approximately 15 minutes or less to complete. In order to protect your confidentiality, no names or codes will be used to identify you. Surveys will be destroyed after all surveys have been collected.

Dr. Lynda Goodfellow will have access to the information you provided. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, The office of human protection (OHRP)). The information you provide will be stored on a password and firewall protected computer. Your name and other facts that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally.

Contact Dr. Lynda Goodfellow at LtGoodfellow@gsu.edu or 404.413.1223 if you have questions, concerns, or complaints about this study. You can also call if you think you have been harmed by the study. Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about the questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

Your completion and submission of the survey indicate your consent to participate in this research. You may withdraw at any time by not completing or by submitting a blank survey.

The information from this research may be published in journals or presented at professional meetings. This research does not cost the participant in any way. There are no known risks associated with participation. We do not predict that this study will cause any harm or discomfort. However, Should you be uncomfortable about completing the survey, simply submit a blank survey.

Thank you in advance for your cooperation.

Sincerely,

Lynda T. Goodfellow, EdD, RRT, AE-C
Abdullah Alanazi, BS, RRT-NPS

Please note: Completion and submission of this survey implies that you have read this information and consent to participate in this research. If you agree to participate in this research, please continue with the survey. You can print a copy of the form for your records.

- o I Agree
- o I Disagree