AWARENESS, PERCEPTIONS, AND USE OF ELECTRONIC CIGARETTES AMONG HEALTH CARE WORKERS IN THE MINISTRY OF HEALTH AT RIYADH, SAUDI ARABIA, 2020.

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ABSTRACT

Introduction: Electronic nicotine delivery systems (ENDS), known as e-cigarettes or electronic cigarettes, are battery-powered devices that produce nicotine without physically burning tobacco. This study assesses the awareness, perceptions, and use of electronic cigarettes among health care workers in Riyadh, Saudi Arabia. Findings will help in policy formulation on how to curb this issue, which causes health problems such as cancer. I am targeting health care workers because they are the front line in ensuring health for the Kingdom of Saudi Arabia.

Methods: We will use a descriptive cross-sectional study to measure perception and awareness of e-cigarettes, identify the various factors associated with the initiation and use of e-cigarettes, and explore the reasons to use e-cigarettes among health care workers in Riyadh. I will conduct a pilot survey among a smaller sample of the population (n = 30) to explore the instrument's reliability and validity to produce accurate results. The pilot survey findings will be used to adjust the tool, and then a more extensive assessment will be conducted. The questionnaire will be self-administered.

Results: The expected results will detail the current use of e-cigarettes, those trying e-cigarettes, intention to use e-cigarettes, and reasons to use as the dependent variables. Age, gender, working, and peers smoking, seeing e-cigarette advertisements, and receiving information about e-cigarettes through social media, which are the independent variables, will be analyzed in detail.

Conclusion: Data will describe baseline awareness and usage of e-cigarettes to help public health authorities identify those groups more at risk of becoming established nicotine users. Findings can facilitate the development of public health strategies and the adoption of various policies to protect health care workers from adverse effects related to e-cigarettes smoking in Riyadh.

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LIST OF ABBREVIATIONS

ENDS	Electronic Nicotine Delivery System
EVALI	E-Cigarette or Vaping Products use Associated Lung Injury
S.D	Standard Deviation
COVID -19	Corona Virus Diseases 2019
FDA	Food and Drug Act
CDC	Centre for Disease Control

CHAPTER ONE
1.1 Introduction
The World Health Organization (WHO) describes tobacco use as an epidemic; it remains one of the major causes of various diseases and premature deaths (WHO, 2020). There are 1.1 billion smokers globally, with 7 million associated deaths annually (Ariel, 2017). It is estimated that deaths related to smoking in the next ten years are likely to increase to about 30 million per year (Ariel, 2017). Although tobacco is not grown in Saudi Arabia, more than 600 million SAR is spent importing tobacco products annually. The prevalence of smoking in the Kingdom of Saudi Arabia (KSA) stands at 21.4% (Algabbania et al., 2018).

Electronic Nicotine Delivery Systems (ENDS), also known as e-cigarettes or electronic cigarettes, are battery-powered devices that deliver nicotine without burning tobacco physically.

Electronic cigarettes consist of three components: a cartridge, an atomizer, and a battery. The cartridge usually contains a fluid composed of nicotine, ranging from 0 to 24 mg/ml, and humectants such as propylene glycol or glycerol and flavorings (Jacobs 2018). An atomizer aerosolizes the fluid when heated by the battery.

According to the Legacy for Health Report (2014), 29.3 million adults globally were exposed to e-cigarette ads on television. Nearly 32.2 million adults, including 9.5 million, were reached through print ads in 2013. Although tobacco advertisements are illegal in Saudi Arabia, the e-cigarette is regulated differently than traditional tobacco products. Advertisements for e-cigarettes appear in various media, including television, radio, print, online, and at retail point of sale, and has contributed to the popularity of the product within the Kingdom (Nilan et al. 2019). Half of adults in KSA reported seeing e-cigarette advertisements at convenience stores, supermarkets, or gas stations; 55% of Saudi health care workers reported seeing e-cigarette advertisements on television (Gruszczynski 2019). Smoking causes heart disease, lung disease, and cancer; it can also increase risk for tuberculosis and autoimmune diseases (Ariel 2017). A low dose of nicotine can cause vomiting, eye irritation, abdominal pain, and nausea. High doses can cause coma, high blood pressure, seizures, tachycardia, and death. Smoking during pregnancy is linked to preterm birth, underweight babies, and damage to infants, such as tissue damage and low brain development (Helen, 2018).

E-cigarettes have been linked to negative impacts on oral health (Wilcox, 2016). Gum disease is associated with smoking because those who smoke consistently develop more tartar on teeth than those who do not smoke. Saliva production is reduced by nicotine in tobacco, increasing bacteria and tarter development in the mouth. It can also lead to the loss of teeth.

Tobacco users are susceptible to lifelong nicotine addiction through e-cigarettes and traditional cigarettes (Gruszczynski, 2019). Understanding why and how people adopt and use e-cigarettes can help public health practitioners develop effective prevention programs to prevent or decrease their use.

1:2 Research statements
Few studies have explored e-cigarette awareness and use among health care workers; existing data lack factors that can influence and correlate with e-cigarette use among health care workers (Ariel, 2017). I will explore e-cigarette awareness and the correlates of use among health care workers in the Saudi Ministry of Health. I will focus on associations between smoking cigarettes and the current use of e-cigarettes, relationships between e-cigarette advertisements and e-cigarette use, and reasons to use e-cigarettes and gender.

1.3 Rationale of the Study
E-cigarette use among health care workers in KSA is a significant concern to the Ministry of Health (MOH) (Nilan et al., 2019). Studies conducted in KSA have shown an increasing demand for tobacco products among health care workers within the MOH. The Saudi government has various policies to curb tobacco use, such as increased prices for tobacco products, but little reduction in use has been achieved (Nilan et al., 2019). The report by Nilan et al. (2019) found an increase in these products' popularity among health workers due to its similarity with a cigarette. Due to various concerns by the MOH, e-cigarettes have been prohibited (Saudi MOH report, 2015). However, some institutions within Saudi Arabia still currently import e-cigarettes and e-cigarette products. Future research needs to address the following questions:

Does e-cigarette use impact the use of traditional tobacco?

How do we educate the population on risks associated with e-cigarette use?

Is using e-cigarette an effective way of reducing traditional tobacco smoking?

1:4 Objectives
Our investigation has the following objectives:

1) Describe the proportion of health care workers who currently use e-cigarettes and identify variables associated with the use
2) Describe various awareness measures to curb the use of e-cigarette among health care workers.
3) Describe the relationship between e-cigarette smoking, gender, and BMI of health care workers

1:5 Significance

According to the United States Surgeon General's Report on Tobacco Use (2020), tobacco continues to cause preventable deaths. Many smokers, including health care workers, are looking for ways of quitting. Saudi Arabia lacks comprehensive assessment of factors that can reduce e-cigarette use among health care workers in KSA.

❖ Findings are expected to inform relevant national policies to curb e-cigarette use among health care workers, improving health outcomes and reducing demands on the health care system.
❖ The study will contribute to the existing literature and data concerning e-cigarette use determinants in Riyadh, Saudi Arabia.
❖ The study will form a basis for future discussions and research in e-cigarette use to facilitate better strategies to reduce e-cigarette use.

CHAPTER TWO
2.0 LITERATURE REVIEW

An atomizer aerosolizes the fluid when heated by the battery. "In a typical device configuration, instead of burning tobacco, a user draws air through the device; an airflow sensor or a physical power button activates a battery that powers an atomizer to produce an aerosol from liquid containing nicotine and flavorings" (Ariel, 2017). The vapor carries a dose of nicotine into the user's lungs through inhalation, and a residual aerosol is released into the environment through exhalation.

E-cigarettes were invented by an American engineer Herbert A. Gilbert in 1963. Although he filed for a patent for his invention in 1965, his product was never commercialized (Wilcox, 2016). Hon Lik, a Chinese pharmacist, was credited with his development of an electronic cigarette in 2003. The Chinese electronic company Ruyan received a patent for e-cigarettes in 2007, sold them online, and exported them to retail establishments in Europe and the United States (Ariel, 2017)

There are various impacts of e-cigarette use on the public due to tobacco smoking, a contentious matter (Rimmer, 2019). Tobacco generates 5,000 chemicals when they are burn, which causes cancer and damage to the lungs and heart (Rimmer, 2019). The combustion of cigarettes' product harms people's health rather than the nicotine in cigarette smoke. Addiction to tobacco smoking results in the most crucial damage to nicotine, causing diabetes, heart diseases, and wound healing after surgery (Helen, 2018). Smoking affects the development of the fetus throughout pregnancy (Davis, 2020). These effects were lesser as compared to tobacco smoke chemicals.

The number of e-cigarette smokers globally has increased, with an estimated 1.1 billion smokers who are adults, which accounts for 59% of smokers globally. The projected global growth of e-cigarette is 7.28% from 2020-2025. This increasing prevalence of e-cigarette use among health care workers raises concerns that it may serve as a gateway to traditional cigarette smoking among non-smokers or delay smoking cessation among current smokers (Gruszczynski, 2019).

The US Food and Drug Administration and US Centers for Disease Control and Prevention recommend that people halt the use of vaping products, e-cigarettes, and nicotine from casual origins such as online dealers, friends, family, or in-person (Davis, 2020). Vaping or e-cigarette products are not supposed to be used by pregnant women or adults with pre-existing conditions such as high blood pressure (Rimmer, 2019).

Most people start smoking at an early age. Some people start smoking because they have friends or parents who smoke, which increases their probability of smoking than individuals who do not. Some care providers try smoking by saying it reduces work stress (WHO, 2020).

E-cigarette advertising appears in various media, including television, radio, print, online, and retail. It has contributed to the popularity of the product and raised awareness among the users. Nearly 31.2 million adults and young adults, including 9.5 million (38%), were reached through print ads in 2013. Health care providers have become aware of e-cigarette advertising at retail sites, on T.V., and through websites have been high. Sixty percent of adults reported seeing e-cigarette advertisements at convenience stores, supermarkets, or gas stations. In contrast, 56% of health care workers reported seeing e-cigarette advertisements on T.V (Wilcox, 2016).

Tobacco companies have spent billions of US dollars on advertisement and promotion, influencing society to engage in tobacco smoking as glamorous, exciting, and safe (Davis, 2020). Tobacco smoking is shown on television, in video games, and online. E-cigarettes are marketed as

fashionable, high-tech "vaping" devices, easy to get and less harmful than traditional tobacco. Users may begin using e-cigarettes and develop nicotine addiction, thus continuously using tobacco products, whether they are e-cigarettes or traditional tobacco (Davis, 2020).

The percentage of health care workers who smoke is increasing (Saudi MOH report, 2019). Smoking risks and knowledge should be given to those practicing the activity to lower the number of new staff introduced to smoking and its impact. Friends and parents should be at the forefront of change to help shape attitudes and behavior because they have a weighed impact to influence their decision (Gruszczynski, 2019). The analysis of awareness and use of electronic cigarettes among health care workers in Riyadh will help public health establish appropriate strategies and policies to quit smoking, including health promotion and education.

CHAPTER THREE: METHODOLOGY
3:1 Study design
This study uses a descriptive cross-sectional design to explore the perception and awareness of e-cigarettes among health care workers in the Kingdom of Saudi Arabia.

3:2 Study setting
The research will be conducted in the MOH administrative building in Almurabba District, Riyadh, Saudi Arabia.

3:2 Study duration
Data will be collected in a period of three months, from January 2021 through March 2021, through a self-administered questionnaire.

3:3 Study populations
The study population will be health care workers at the MOH administrative building in Riyadh, Saudi Arabia.

3.4 Inclusion and exclusion criteria
All health care workers in the Ministry of Health, regardless of their social and economic background, will be targeted for participation. Commercial workers who do not provide direct patient care (i.e., cleaners, secretaries) will be excluded.

3.4 sampling method
3:1:1 (a) Sample
The sample size will be determined using Cochran's formula for calculating sample size for infinite health care providers.

$$n_0 = \frac{z^2 pq}{e^2}$$

Where (n) is the sample size.
Z is the selected critical value of the desired confidence level.
P is the estimated proportion of an attribute that is present in the population.
Q = 1− p and e is the desired level of precision.
When calculating a sample size of several workers whose degree of variability is not known. Assuming the maximum variability, which is equal to 50% (p =0.5) and taking a 95% confidence level with ±5% precision, the calculation for the required sample size will be as follows-
p = 0.5 and hence q =1-0.5 = 0.5; e = 0.05; z =1.96
n =384.16 =384
Based on this model, the minimum sample size needed is 384. Given the potential for a lower response rate, I will target 500 participants and depending on initial response rate, I will invite more participants to ensure the target n=384 is achieved. Any additional participants will be a welcome addition as it will strengthen the study further.

3:1:2 (b) Sampling techniques
I will use the staff register to do a random sampling technique (choosing every third name), after which I will email the selected individuals through the management office.

3:5 Data collection technique
Data will be collected using a self-administered questionnaire (Appendix A). This methodology follows World Health Organization guidelines to reduce contact between individuals during the COVID-19 pandemic.

Data collection tool:
We will do a pilot survey with a smaller sample size (n = 30) to evaluate the questionnaire. Findings from the pilot testing will be used to adjust the tool, and then we will conduct a more extensive assessment.

3.6 Statistical analysis
Data will be entered and analyzed using Microsoft Excel and Epi Info. Results will be analyzed using descriptive statistics and presented in one-way frequency tables. Categorical variables will be outlined as frequencies and proportions (percentages). Mean values and corresponding standard deviation (S.D.) values will be measured to summarize continuous variables.

Comparisons will be presented in two-way frequency tables to compare distributions of dependent and independent variables. The Chi-squared ($\chi 2$) test and independent t-test will be calculated for categorical, predictive statistics, and numerical data.

3.7 Ethical considerations
Approvals will be obtained from the Saudi Field Epidemiology Training Program education authority, local authority, and health ministry.

The study proposal will be submitted to King Saud University for ethical review and approval. Data collected will be confidential and used only for study purposes. No personally identifiable information will be collected. Data will be stored in a computer and protected with a password.

We anticipate no risks associated with participating in this study. This essential information will help formulate policies that will guide future health care workers to alleviate the effects of smoking and support the Ministry of Health plan for the future.

3.8 Study variables
The current use of e-cigarettes, trying e-cigarettes, intention to use e-cigarettes, and reasons to use will be identified as dependent variables. Age, gender, working environment, parents smoking, peers smoking, seeing e-cigarette advertisements, and receiving information about e-cigarettes through social media and fellow workers will be identified as independent variables.

3.9 Instrument: the questionnaire:
The questionnaire will be developed based on the researcher gap of lack of awareness and perspective of e-cigarette smoking and taking guidelines from similar studies. The questionnaire will be written in English and translated to Arabic for administration; 95% of Riyadh health care workers speak Arabic.

CHAPTER FOUR
4.1 Expected Results
Findings from the study can develop public health strategies to protect health care workers from adverse effects related to the e-cigarette use.

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APPENDIX
QUESTIONNAIRE

Part A. Socio-Demographics information

Directions: Circle the one that applies for each.
1) What is your age…………. Years
2) Sex: male…………………female ……….,
3) Marital status: married…………single ………, divorced………, widowed……., separated…....
4) Nature of employment: permanent………….contract……………..
5) Job description: nurse, pharmacist, physician

Part B. Knowledge on Electronic cigarette
1)   On a scale of 1 to 5, where one is low/not familiar, and five is high/very knowledgeable, how familiar are you with e-cigarettes?

1   2   3   4   5
2) Have you ever seen an advertisement for electronic cigarettes on T.V.?
a. Yes   b. No

3) Have you ever heard advertisements for electronic cigarettes on the radio?
a. Yes   b. No

4) Have you ever seen advertisements for electronic cigarettes in magazines or newspapers?
a. Yes   b. No

5) Have you ever received information about electronic cigarettes through social media (examples include; Facebook, YouTube, Twitter, Blog, and others)?
a. Yes   b. No

6) Have your peers or friends ever talked to you about electronic cigarettes?
a. Yes   b. No

7) If yes, would you describe the conversation as positive or negative? ....

Part C. Electronic cigarettes experiences
1) Have you ever tried an electronic cigarette, even a puff?
a. Yes, b. No
2) Do you use electronic cigarettes now?
a. No, I have never used
b. No, but I have used it in the past
c. Yes, I use electronic cigarettes occasionally (not daily)
d. Yes, I use electronic cigarettes every day
3) Which of the following have you EVER used? Check all that apply:
a. Traditional cigarettes
b. Smokeless tobacco (snuff, chewing tobacco)
c. Waterpipe tobacco (hookah or naghile)
d. Electronic cigarettes
e. None of these
4) Which one of the following did you use first?
a. Traditional cigarettes
b. Smokeless tobacco (snuff or chewing tobacco)
c. Waterpipe tobacco smoking (hookah or narghile)
d. Electronic cigarettes

e. None of these

5) Which of the following do you currently use? Check all that apply.

a. Traditional cigarettes

b. Smokeless tobacco (snuff or chewing tobacco)

c. Waterpipe tobacco smoking (hookah or narghile)

d. Electronic cigarettes

e. None of them

6) Which of the following would you consider using in the future? Check all that apply.

a. Traditional cigarettes

b. Smokeless tobacco (snuff or chewing tobacco)

c. Water pipe tobacco smoking (hookah or narghile)

d. Electronic cigarettes

e. None of these

7) Please explain why: _____

_____

8) Do any of your close friends use electronic cigarettes?

a. Yes, b. No   c. Don't know

9) Does your mother or father (guardian) use electronic cigarettes?

a. Yes, both my mom and dad use

b. Yes, my mom uses

c. Yes, my dad uses

d. No, neither my mom nor dad use

10) Does anyone else in your family use electronic cigarettes? Circle all that apply.

a. Brother (s)/Sister(s)

b. Grandmother

c. Grandfather

d. Uncle

e. Aunt

f. Other, cousin

g. No one uses

h. I don't know

Part D. Reasons to use electronic cigarettes

Direction: Please fill the circle that most accurately reflects your ideas or experiences.

IF YOU USE E-CIGARETTES, PLEASE ANSWER QUESTION 1, AND IF YOU DON'T USE E-CIGARETTES, PLEASE GO TO QUESTION 2.

1) Please indicate your level of agreement on each of the following statements as reasons you use e-cigarettes.

I use e-cigarettes….   Strongly Disagree   Disagree   Neutral/Unsure Agree Strongly Agree

  i.Because of curiosity

  ii.Because of habit

 iii.Because it is healthier than smoking tobacco

 iv.Because it is cheaper than

  v.Smoking tobacco

 vi.To quit smoking

vii.To deal with stress

viii.To lose weight

 ix.To socialize with friends

2) Please indicate your level of agreement on each of the following statements as reasons you think health care workers use e-cigarettes.

Health care workers use e-cigarettes…   Strongly Disagree   Disagree

Neutral/Unsure   Agree   Strongly Agree

  i.Because of curiosity

  ii.Because of addiction

 iii.Because it is healthier than smoking tobacco

   iv. Because it is cheaper than
    v. Smoking tobacco
   vi. To quit smoking
  vii. To deal with stress
 viii. To lose weight
   ix. To socialize with friends

Part E. Tobacco Smoking
Directions: Please circle the answer that most accurately reflects your experiences for each of the following items about tobacco and cigarettes (not e-cigarettes)
1) Have you ever smoked a cigarette, even one puff?
a. a. Yes,   b. No
2) Do you smoke cigarettes?
a. No, I have never smoked
b. No, but I have smoked in the past
c. Yes, occasionally (not daily)
d. Yes, I smoke every day

If you circled is "a or b" in 1 (non-smokers), please skip questions 3 and 4, and go to question
3) If you circled "c or d" (smokers), continue with 19 to the end.
4) How many cigarettes have you smoked in the last 30 days?
a. Less than ten cigarettes
b. 10-19 cigarettes
c. 20-29 cigarettes
d. More than 30 cigarettes
5) Have you ever tried to quit smoking?
a. Yes, b. No
6) Does one or more of your close friends smoke cigarettes?
a. Yes, b. No   c. Don't know
7) Does your mother or father smoke cigarettes?
a. Yes, both my mom and dad smoke
b. Yes, my mom smokes
c. Yes, my dad smokes
d. No, neither my mom nor dad smoke
8) Who in your family smokes? Circle all that apply.
a. Brother(s) / Sister(s)
b. Grandmother
c. Grandfather
d. Uncle
e. Aunt
f. Other, cousins
g. No one use
h. I don't know
9) Part F. Thoughts about electronic cigarettes

10) Is   there   anything   else   you   want   to   tell   us   about   e-cigarette   use?
    _____
    _____