



Research Paper

## E- Cigarette : Knowledge of and Attitude of physician and nurses working at Primary Health Care Centers of Al Ahsa region of Saudi Arabia.

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### Abstract:

#### Background

Electronic cigarettes (e-cigarettes) whose emission typically contains nicotine and other toxic substances are not only harmful to the users but also the non user who are exposed to the aerosol. Various studies suggest that e-cigarettes smoking are getting popular in Saudi Arabia, especially among college students and younger professional. There is a strict anti smoking law in place in Saudi Arabia since the year 2016 which bans all forms of tobacco use in public areas (including e-cigarettes). Despite the country's efforts to combat use, e-cigarettes are still gaining popularity in the community. A good knowledge and a negative attitude towards e-cigarettes among the health professionals is needed to propagate correct information regarding the harmful effect of e-cigarettes to the population. The purpose of this study is to assess the knowledge about the e-cigarette smoking and the attitude of the physicians and para medical staffs working at different primary health care centers of Al Ahsa region of Saudi Arabia."

#### Materials and Methods:

It will be a cross sectional survey. All the General physicians working at the different Primary Health Care centers of Al Ahsa region of Saudi Arabia were the study population. The sample size was derived by computing the minimum sample size required for accuracy in estimating proportions by considering the standard normal deviation set at 95% confidence level (1.96), percentage picking a choice or response (50% = 0.5) and the confidence interval (0.05 = ±5). The calculated sample size was 377 in number. stratified random sampling technique was used to select participants from different ministry of health run PHCs of Al Ahsa district. The data were collected through pre-tested, predesigned and self administered questionnaires administered to the participants online through Google programme. The collected data were cleared, coded, entered and analyzed by the SPSS version 26. Descriptive statistics was presented using counts, proportions (%), mean ± standard deviation whenever appropriate. The relationship of the knowledge and attitude of the participants towards e-cigarette smoking with the socio- demographic characteristics was performed using chi square test. A p-value cut off point of 0.05 at 95% CI will be used to determine statistical significance.

### **Results**

A total 293 medical staffs participated in the study. The mean age of the participants was 35.78 years  $\pm$  Std. Dev. 7.32. The majority of the participants were female (55.3%). More than forty eight percent of the participants (47.8%) were graduate. Eighty seven percent of the participants were married (87.0%). More than thirty one percent (31.1) of the respondent were nurses while 44.7%, 13.7% and 7.8% were general practitioner, specialist and consultant respectively. Vast majority of the participants (79.9%) were non smoker while 14.7% were smoker and 5.5% past smoker. Majority of the participants (67.9%) had good knowledge regarding the e-cigarettes. The knowledge of e-cigarettes smoking was significantly higher among the female and the married participants ( $P=0.043$ ). As the educational status increased the good knowledge regarding e cigarette also increased significantly ( $p=0.019$ ). Majority of the participants (56.3%) had positive attitude against the use of e-cigarettes smoking. The positive attitude against the e-cigarettes smoking was more prevalent among the male participants ( $P= 0.043$ ) the married participants ( $P=0.045$ ). As educational level increased, the positive attitude of the participants against the e-cigarettes smoking also increased significantly ( $P= 0.05$ ). The positive attitude against the e-cigarettes smoking was significantly higher among the consultant followed by general practitioner, specialist and nurses ( $P=0.028$ ).

### **Conclusion:**

The present study has found a considerably better knowledge among the medical staffs working at the primary health care centers of Al Ahsa. However the attitude against the e –cigarette smoking was not up to the mark. Considering the increased use e-cigarette among the population and at the same time increased number of smokers visiting the smoking clinic for smoking cessation, there is a need of guidelines and education to aid the health care workers counseling of patients about the e- cigarette and cessation of smoking.

### **Key words**

**Knowledge, Attitude ,E- cigarette ,Primary Health care Centers**

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## **I. Introduction:**

Electronic Cigarettes (E- cigarette), also known as electronic nicotine delivery systems (ENDS) are battery-operated devices which produce an aerosol by heating a liquid that usually contains nicotine and a liquid solution of propylene glycol and/or vegetable glycerin. The user inhales the aerosol into their lungs.<sup>[1]</sup> E-cigarettes were promoted as safer alternative to conventional cigarettes for current smoker as it was expected to cause less harm than the conventional tobacco cigarettes. However the evidences suggest that e-cigarettes whose emission typically contains nicotine and other toxic substances are not only harmful to the users but also the non user who are exposed to the aerosol. Even nicotine free products (ENNDS) claimed by different e-cigarettes producing company also contains nicotine.<sup>[2]</sup> Most e-cigarettes contain nicotine, which has been reported as highly addictive, toxic to developing fetuses, can harm adolescent and young adult brain development and can be health danger for pregnant adult's and their developing babies. However as compared to traditional cigarette, e-cigarette aerosol generally contains fewer chemicals than smoke from burned tobacco products.<sup>[3]</sup> This includes cancer-causing chemicals and tiny particles that reach deep into lungs. However, e-cigarette aerosol generally contains fewer harmful chemicals than smoke from burned tobacco products.<sup>[4]</sup> CDC has recently reported the outbreak of a serious lung injury associated with the use of e-cigarettes. The outbreak in USA affected 805 cases with 12 deaths confirmed.<sup>[5]</sup>

E-cigarettes are also getting becoming popular in Saudi Arabia, especially among college students and younger professional. A study in Jeddah city has revealed that the majority of students who practiced smoking were actually using e-cigarettes.<sup>[6]</sup> One more study in Saudi Arabia reported that e-cigarettes was more common among young adults and those who have previously tried tobacco smoking.<sup>[7]</sup>

Antismoking clinics have been set up in each sector of Primary Health Care Center throughout Saudi Arabia by Ministry of Health to facilitate the best preventive and therapeutic services to the largest of those willing to quit smoking. Counseling services are set up to make people aware about the harmful effect of smoking. With the introduction of e-cigarettes in the market the smokers find it safer for health and are switching to e-cigarettes smoking. It's the responsibilities of the medical staffs to warn the people against the harmful effect of e-cigarettes as well. For this they must have sound knowledge about the e-cigarettes and negative attitude towards it. Studies show the health professionals themselves are no longer found to abstain from the e-cigarettes. One Pakistani study has reported that the health care professionals had favorable attitude towards e-cigarettes smoking with the perception that e-cigarettes is less harmful than the traditional smoking.<sup>[8]</sup> A low level of knowledge about e-cigarette has also been reported in one Saudi study where the health college students were found to have misconceptions about e-cigarettes and recognized it as smoking cessation tool and did not know that it contains toxic component similar to conventional cigarettes.<sup>[9]</sup>

There is a strict anti smoking law in place in Saudi Arabia since the year 2016 which bans all forms of tobacco use in public areas (including e-cigarettes). Despite the country's efforts to combat use, electronic cigarettes are still gaining popularity in the community. A good knowledge and a negative attitude towards e-cigarettes among the health professionals is needed to propagate correct information regarding the harmful effect of e-cigarettes. The present study was conducted to investigate the knowledge and attitude regarding e-cigarettes among the medical and paramedical staffs working at the different Primary Health Care Centers of Al Ahsa region of Saudi Arabia.

## **II. Materials and Methods:**

It was a quantitative cross sectional study. All the General physicians working at the different Primary Health Care centers of Al Ahsa region of Saudi Arabia were the study population. According to the 2022 version of health cluster pay roll there are about 500 physicians and around 2000 para medical staff distributed among the 71 PHC of Al Ahsa region. The sample size was derived by computing the minimum sample size required for accuracy in estimating proportions by considering the standard normal deviation set at 95% confidence level (1.96), percentage picking a choice or response (50% = 0.5) and the confidence interval (0.05 = ±5). The formula  $n = z^2 \frac{p(1-p)}{c^2}$  was applied where  $z$  = standard normal deviation set at 95% confidence level,  $p$  = percentage picking a choice or response based on a previous study where 50% of the physicians had moderate knowledge about e smoking,  $c$  = confidence interval. The calculated sample size is found to be 377. To achieve the required sample size, stratified random sampling technique was used to select participants from different ministry of health run PHCs of Al Ahsa district. The data were collected using a self-administered bilingual questionnaire Arabic /English (A modified validated questionnaire) which were distributed online through Google Form. Consent from the participants was taken online. The questionnaire comprised of three sections. The **first section** of the questionnaire included information on demographics characteristics such as - age, gender, specialty, socioeconomic status and marital status; the **second part contained** 5 questions regarding assessment of knowledge about e-cigarette while the **third section** had 5 questions related to attitude towards e-cigarette usage. However a pilot study on 10 physicians was done before starting the study to validate the reliability of the questionnaire. The pilot survey was administered giving more emphasis on internal consistency reliability and the construct validity. A reliability test (Cronbach's alpha) was utilized to measure the internal consistency of the items. The item analysis with Cronbach's alpha was carried out via SPSS for the same respondents in the pilot study to identify problematic items. The collected data were cleared, coded, entered and analyzed by the SPSS version 26. Descriptive statistics was presented using counts, proportions (%), mean ± standard deviation whenever appropriate. The relationship of the knowledge and attitude of the participants towards e- cigarette smoking with the socio- demographic characteristics was performed using chi square test. A p-value cut off point of 0.05 at 95% CI will be used to determine statistical significance. There were 5 questions each on knowledge and attitude sections. Correct answer was awarded with 1 score while incorrect with zero score. In the both sections score ranged from 0 to 5, the higher the score the higher the knowledge and positive attitude. By using the mean as a cutoff point, the level of knowledge and attitude were measured. The participants were classified as having poor knowledge and good knowledge on the score range of 0 to 5 points. A good knowledge score range was above the mean cut off point while the poor knowledge was below the mean cutoff point. Similarly the participants were classified as having negative attitude and positive attitude the score range of 0 to 5 points. A positive attitude against the e cigarette smoking was above the mean score while below the mean score were considered as having negative attitude against the e cigarette smoking. For the convenience of interpretation neutral answer was considered as disagree. A prior permission from the local research committee was taken before the start of the study..

## **III. Results:**

### **Socio demographic characteristics of the participants:**

A total 293 medical staffs participated in the study making the response rate of 77%..The mean age of the participants was 35.78 years ± Std. Dev. 7.32 years (range 19-55 years). The majority of the participants were female (55.3%). More than forty eight percent of the participants (47.8%) were graduate followed by those (21.1%) who were post graduate and the rest 31.1% were diploma holder. Eighty seven percent of the participants were married (87.0%) while 11.3% were unmarried and only 1.7% was divorced. More than thirty one percent (31.1) of the respondent were nurses while 44.7% , 13.7% and 7.8% were general practitioner ,specialist and consultant respectively. The majority of the participants were from urban PHC (64.2%). Vast majority of the participants (79.9%) were non smoker while 14.7% were smoker and 5.5% past smoker. The details of the socio demographic characteristics are shown in table 1.

**Table 1:** Showing the socio demographic characteristics of the participant

Variables	No.	Percentage
Age Mean age 35.78 years ± Std. Dev. 7.32 years ( range 19-55 years)		
Sex		
Male	131	44.7
Female	162	55.3
Marital status		
Unmarried	33	11.3
Married	255	87.0
Divorced	5	1.7
Education		
Diploma holder	91	31.1
Graduate	140	47.8
Post graduate	62	21.1
Job position		
Nurses	99	33.8
General physician	131	44.7
Specialist	40	13.7
Consultant	23	7.8
Place of posting		
Rural	188	64.2
Urbam	105	35.8
Smoking status		
Non smoker	238	81.2
Smoker	43	14.7
Past smoker	12	4.1

**Responses on knowledge questionnaires:**

More than three fourth of the participants (77.5%) answered that the e-cigarettes contain nicotine while 6.8% answered that it does not contain nicotine and 15.7% of the participants did not know about it. When asked about the comparison of health safety of e-cigarettes and tobacco cigarette, 42.7% of the participants did not find any difference between them while 44.7% of the participants replied that e cigarette are safer and less harmful than the tobacco cigarette .However 12.6% of the participant answered that e-cigarettes is more harmful and unsafe to use than the regular tobacco cigarette. On the question that whether e-cigarettes cause same addiction as normal cigarette 77.5% of the participants answered yes while 4.4% did say no. More than eighteen percent of the participants did not know about this. Almost twelve percent (11.9%) of the participants agreed that e-cigarettes is helpful aid for smoking cessation while three fourth (74.4%) of the participants did not agree with this and 13.7% of the participants did not know about this. On the statement that e-cigarettes reduce passive smoking, the answer of only 10.6% of the participants was yes while majority of them (69.3%) did not agree with this statement and 20.1% of them did not know about this. The details of the response on the knowledge question are shown in table 2.

**Table2** Showing the response on the knowledge question

Knowledge questionnaires	No.	Percentage
Does the E-cigarette contain Nicotine		
Yes	227	77.5
No	20	6.8
I don't know	46	15.7
How would you compare the health and safety of e- cigar to the traditional tobacco cigarette.		
1. There is no real difference between them.	125	42.7
2. E-cigarettes are safer and less harmful to use than tobacco cigarettes	131	44.7
3. E-cigarettes are more harmful and unsafe to use than tobacco cigarettes	37	12.6
Does the e-cigarette cause addiction same as normal cigarette?		
Yes	227	77.5
No	13	4.4
I don't know	53	18.1
E cigarettes is helpful aid for smoking cessation		
Yes	35	11.9
No	218	74.4
I don't know	40	13.7
E cigarettes reduce passive smoking		
Yes	31	10.8
No	202	69.3
I don't know	59	20.1

**Responses on the attitude questionnaires:**

As far as the attitude of the participants towards e-cigarettes is concerned, 92.1% of them either agreed or strongly agreed that e-cigarettes use is a public health concern. However 2.4% of the participants disagreed or with this view .However 5.5% of the participants were neutral on this statement.. Similarly 77.9% of the participants agreed with the statement that e-cigarettes would be regulated like other tobacco products. On the other hand 10.2% of the participants did not agree with this statement and 11.9% of the participants were neutral on this statement. More than seventy five percent (75.8%) of the participants disagreed for the recommendation of e-cigarettes as a good way to quit or cut down the use of traditional cigarette. Almost fifteen percent (14.7%) of the participants either agreed or strongly agreed on it and 9.6% were neutral in their statement. On the statement that e-cigarettes is good because it does not cause side effects, 77.8% of the participants disagreed while 5.8% were neutral on this statement and 16.4% of the participants agreed with this statement. The details of the responses on the attitude questions are shown in table 3.

**Table 3:** Showing the details on the responses of the attitude questionnaires

Variables	No.	Percentage
E cigarette use is a public health concern		
Strongly disagree	0	0.0
Disagree	7	2.4
Neutral	16	5.5
Agree	97	33.1
Strongly Agree	173	59.0
E-cigarette should be regulated like other tobacco products		
Strongly Disagree		
Disagree	30	10.2
Neutral	35	11.9
Agree	74	25.3
Strongly disagree	154	52.6
Would you recommend e-cigarettes as a good way to quit or cut down on use?		
Strongly disagree		
Disagree		
Neutral	222	75.8
Agree	28	9.6
Strongly agree	33	11.3
	10	3.4
E-cigarette is good because it does not cause side effects		
Strongly disagree		
Disagree	228	77.8
Neutral	17	5.8
Agree	44	15.0
Strongly agree	4	1.4

**Knowledge score and association of knowledge of E cigarettes with the socio demographic characteristics**

The mean knowledge score of the participants towards e-cigarettes was 2.84 ±Std. Dev 1.04. Majority of the participants (67.9%) had good knowledge regarding the e-cigarettes. The knowledge of e-cigarettes smoking was significantly higher among the female than their male counterparts (69.13% vs, 66.41%,P=0.046).Similarly the good knowledge about the e-cigarettes smoking was significantly higher among the married than those of un married (67.84% vs.63.63% ,P= 0.043). As the educational status increased the good knowledge regarding e ciggerrete also increased significantly (77.41% among post graduate Vs. 70.71% among graduate Vs.57.14% among the diploma holder ,p=0.019).The good knowledge among the general physician was more than those of consultant ,specialist and nurses but it was not statistically significant (71.75% vs.69.56% vs.65% vs.63.63% ,P=0.593).Similarly the good knowledge about the e-cigarettes was better among the smoker than those of non smoker and past smoker (72.09 vs.68.06 vs.50%). However it was not statistically significant (P=0.437).The details of the knowledge score and its association with the socio demographic characteristics of the participants are shown in table 4.

**Table 4:** Showing the details of the knowledge score and its association with the socio demographic characteristics

Variables	Good knowledge No.(%)	Poor Knowledge No.(%)	P value
Knowledge score: Mean score; 2.84 ±Std. Dev 1.04 Range 1-5)	199(67.9)	94(32.1)	
Sex			0.046
Male	87(66.41)	44(33.59)	
Female	112(69.13)	50(30.87)	
Marital status			0.043
Unmarried	21(63.63)	12(36.37)	



Married	173(67.84)	82(32.16)	
Divorced	5(100)	0(0.0)	
Education			0.019
Diploma holder	52(57.14)	39(42.86)	
Graduate	99(70.71)	41(29.29)	
Post graduate	48(77.41)	14(22.59)	
Job position			0.593
Nurses	63(63.63)	36(36.37)	
General physician	94(71.75)	37(28.25)	
Specialist	26(65.0)	14(35.0)	
Consultant	16(69.56)	7(30.44)	
Place of posting			0.518
Rural	128(68.08)	60(31.92)	
Urban	71(67.61)	34(32.39)	
Smoking status			0.437
Non smoker	162(68.06)	76(31.94)	
Smoker	31(72.09)	12(27.31)	
Past smoker	6(50.0)	6(50.0)	

### Attitude score of the participants towards e-cigarettes and its association with the socio demographic characteristics.

The mean attitude score of the participants towards e-cigarettes smoking was  $3.44 \pm \text{Std. Dev.}2.52$ . Majority of the participants (56.3%) had positive attitude against the use of e-cigarettes smoking. The positive attitude against the e-cigarettes smoking was more prevalent among the male participants than those of male counterpart (59.54% vs. 53.70%,  $P= 0.043$ ). The positive attitude against the e-cigarettes smoking was significantly more among the married participants than those who were unmarried 56.86% vs.45.45% ( $P=0.045$ ). As educational level increased, the positive attitude of the participants against the e-cigarettes smoking also increased significantly. It was highest among the post graduate participants followed by degree holder and the diploma holder (62.90% vs.60.0% vs.46.15%,  $P= 0.05$ ). The positive attitude against the e-cigarettes smoking was significantly higher among the consultant followed by general practitioner, specialist and nurses (65.21% vs.63.35% vs.57.5% vs. 44.44%,  $P=0.028$ ). Positive attitude against the e-cigarettes smoking was more among the participants of the urban area than the rural area but it was not statistically significant (60.9% vs.53.72%,  $P=0.141$ ). Similarly there was insignificant association of positive attitude against the e cigarette was among the participants of different smoking status (58.33% among the past smoker vs.57.14% among the non smoker and vs.51.16% among the smoker,  $P=0.760$ ). The details of the Attitude score of the participants towards e-cigarettes and its association with the socio demographic characteristics are shown in table 5.

**Table 5:** Showing the Attitude score of the participants towards e-cigarettes and its association with the socio demographic characteristics

Variables	Positive attitude No.(%)	Negative attitude No.(%)	P value
Attitude score: Mean score $3.44 \pm \text{Std Dev.}2.5$	165(56.3)	128(43.7)	
Sex			0.042
Male	78(59.54)	53(40.46)	
Female	87(53.70)	75(46.30)	
Marital status			0.043
Unmarried	16(45.45)	18(54.55)	
Married	145(56.86)	110(43.14)	
Divorced	4(100.0)	0(0.00)	
Education			0.050
Diploma holder	42(46.15)	49(53.85)	
Graduate	84(60.0)	56(40.0)	
Post graduate	39(62.90)	23(37.1)	
Job position			0.028
Nurses	44(44.44)	55(55.56)	
General physician	43(63.35)	48(36.65)	
Specialist	23(57.5)	17(42.5)	
Consultant	15(65.21)	8(34.79)	
Place of posting			0.141
Rural	101 (53.72)	87(46.28)	
Urban	64(60.9)	41(39.10)	
Smoking status			0.760
Non smoker	136(57.14)	102(42.86)	
Smoker	22(51.16)	21(48.84)	
Past smoker	7(58.33)	5(41.67)	

**Association of knowledge and attitude of the participants towards e-cigarette smoking.**

Those participants who had a good knowledge regarding the **e-cigarette** smoking demerits had better positive attitude against the **e-cigarette** (59.79% vs.48.93% P=0.050).On multivariate logistic regression analysis those participants with better knowledge had 1.5 times chance of having good attitude against the **e-cigarette** The details of the association of knowledge and the attitude of the participants towards **e-cigarette** smoking is shown in table 6.

**Table 6:** Showing details of the association of knowledge and the attitude of the participants towards **e-cigarette**

Variables	Positive attitude ( against e- cigarette smoking) No.(%)	Negative Attitude ( against e- cigarette smoking) No.(%)	P value
Good Knowledge	119(59.79)	80(40.21)	0.050
Poor Knowledge	46(48.93)	48(51.07)	

**IV. Discussion:**

Thee- cigarette smoking is getting a public health issue since its use among the smokers specially the younger generation is increasing because of their ignorance about the harmful effect of e- cigarette.The public health workers play a crucial role in creating an awareness regarding the harmful effect of e- cigarette among the people attending the health care centers. The correct knowledge of e cigarette and a negative attitude towards the e- cigaretteamong the health care staff is needed for fruitful result in dissemination the information. The present study was conducted in one of the largest district of Saudi Arabia (Al Ahsa) to assess the knowledge and attitude of the medical staffs working at different Primary health care Centers of Al Ahsa district. This study has found that though the knowledge of the majority of the health staffs (67.9%) was good but their attitudes against e- cigarette were not fully supporting their knowledge. In a similar Pakistani study the researchers have found that 59% of the respondents’ medical graduate had good knowledge about thee-cigarette.<sup>[10]</sup>In this study a significant correlation was found between current smokers and higher chances of their knowing about e-cigarettes and increased likelihood of its use compared to others. However in the present study the good knowledge about the e- cigarette was not having statistically significant relationship between the smoker, non smoker and the past smoker (P=0.437)However in a Lebanese <sup>[11]</sup> and a Philippines studies<sup>[12]</sup> the researchers have found lower level of knowledge regarding the e- cigarette among the health care providers The Philippine study has found poor knowledge more evident among the female and those who were non smokers.Selamoglu, M et al in their systematic review study involving 4056 abstracts have concluded that most General physicians lacked knowledge and confidence in discussing with the patients regarding e- cigarette safety and efficacy as smoking cessation.<sup>[13]</sup>In the present study ,three fourth of the health workers were of the opinion that e- cigarette is as additive as the normal tobacco cigarette while the Lebanese study<sup>[11]</sup> has found that 65% of the health care provider thought that it is harmless and not addictive.One Jordanian study has reported that 72.3% of the healthcare professional considered that the e- cigarette contain nicotine. <sup>[14]</sup> The present study has also noted that 77.5% of the participants agreed that the e- cigarette contain Nicotine. In an American study 91% of the participant physicians were aware of the nicotine content of e-cigarettes, but only 20% and 39%, respectively, were aware of the presence of carcinogens and polyethylene glycol.<sup>[15]</sup>The North Carolina study has showed that 67% of the surveyed physicians indicated e-cigarettes as a helpful aid for smoking cessation. However the present study found that more than seventy five percent (75.8%) of the participants disagreed for the recommendation of e- cigarette as a good way to quit or cut down the use of traditional cigarette. <sup>[16]</sup> The North Carolina study also revealed that the surveyed physicians were more likely to recommend e-cigarettes when their patients asked about them.In other American study the researchers have found that most primary health care physicians considered e-cigarettes at least somewhat effective for smoking cessation (66%) and lowering disease risk (65%); 31% perceived e-cigarettes to be equally/more effective than traditional cessation aids.<sup>[17]</sup>

**V. Conclusion:**

The present study has found a considerably better knowledge among the medical staffs working at the primary health care centers of Al Ahsa. However the attitude against the e –cigarette smoking was not up to the mark. Considering the increased use e-cigarette among the population and at the same time increased number of smokers visiting the smoking clinic for smoking cessation, there is a need of guidelines and education to aid the health care workers counseling of patients about the e- cigarette and cessation of smoking.

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