

# Awareness of current mobile apps for smoking cessation among the dental and medical practitioners in Saudi Arabia

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**Abstract. – OBJECTIVE:** This study aimed at assessing whether the dental and medical practitioners in Saudi Arabia are aware of the smoking cessation smartphone applications and their opinions about this method used in smoking cessation.

**MATERIALS AND METHODS:** A self-reporting questionnaire was designed to assess the level of knowledge and awareness among the dental and medical practitioners regarding the smartphone mobile applications for smoking cessation. The content of the questionnaire was validated and sent to individual physicians through email, WhatsApp, Twitter and other social media platforms, which also contained a consent form and explanation of the study. Responses were summarized using descriptive statistics by frequencies and percentages. A Chi-square test was used to observe the differences in opinions of smoking cessation apps between smokers and non-smokers among all the participants.

**RESULTS:** A total of 420 responses were obtained from the dental and medical professionals (291 males and 129 females) in different ranks. Among all the participants, 46.7% were in the age range of 30-40 years. The profession of the participants was divided into four groups and general dental practitioners are the most respondents compared to other practitioners. Among all the participants, 31% were smokers and the rest were non-smokers. Overall, 12.6% of participants and 20.8% of participants who were smokers were aware of the mobile applications which are used for smoking cessation.

**CONCLUSIONS:** The dental and medical practitioners in Saudi Arabia are not relatively acquainted with mobile apps for smoking cessation.

*Key Words:*

Cessation, Practitioners, Smoking, Smartphone, Mobile Apps.

## Introduction

Although most people understand the harmful effects, as well as the complications of tobacco

smoking on their health and life, more than one billion in the whole world still smoke. The proportion of adult smokers is about one-fifth of the world's adult population<sup>1</sup>. Smoking is a major cause of serious illnesses such as cancer, respiratory disease, cardiovascular disease, and diabetes. It is responsible for 12% of death in those aged 30 and above<sup>2</sup>. As such, it is pivotal to cease smoking to prevent premature death.

Along with general health, the smoking habit is contemplated as a major threat to oral health. Smoking increases the risk of tooth loss, periodontal disease, and discoloration of the teeth. Moreover, 75% of oral cancer is caused by smoking<sup>3</sup>. It was also reported that smoking plays an important role in plaque formation on dental surfaces<sup>4</sup>. In addition, vascular changes and gingival bleeding from plaque-induced gingivitis are also affected by smoking<sup>5</sup>.

There are different modalities developed to assist in the cessation of the smoking habit. Pharmacological, psychological, behavioral assistance and a combination of these methods are suggested by many tobacco-control programs to help smokers to quit smoking. Many studies suggest medication and counseling services which provide good results<sup>6,7</sup>. Mobile phone-based smoking cessation counseling through phone calls and short message service (SMS) is also effective to aid smokers to quit<sup>8</sup>. Nicotine replacement therapy (NRT) and E-cigarettes are also considered important factors for ceasing smoking<sup>9-11</sup>. However, these methods are expensive, time-consuming, and rely on input from health care workers.

In Saudi Arabia, the number of deaths due to the diseases caused by tobacco smoking is rising<sup>12</sup>. Thus, the government is striving to reduce the use of tobacco throughout the nation. In 2016, the government has banned tobacco companies

from advertising their products<sup>13</sup> and smoking now is not allowed in many public spaces such as public transport, educational, health, and social institutions. The government also implement many initiatives to help smokers to quit smoking such as anti-smoking campaigns, smoking cessation clinics, and mobile text messages and applications<sup>14</sup>.

Many smartphone applications have delivered health education services successfully, for example monitoring physical activity and helping to improve nutrition and diet intake<sup>15-19</sup>. Smoking cessation applications on the smartphone are promising software programs that have many advantages over the other traditional methods used for smoking cessation services. The app can be downloaded easily on the smartphone at low or no cost at all, does not require any input from the health care provider, can be customized to each specific individual, and raises the user motivation to quit throughout the day using audio-visual features and tracking progress features. Previously, many studies<sup>20-22</sup> assessed the effectiveness of the smartphone applications which intended to create cease smoking and found promising outcomes. Moreover, these mobile applications are used widely in many countries around the world to motivate smokers to reduce smoking and ultimately quit it. Therefore, this study aimed at evaluating whether the dental and medical practitioners in Saudi Arabia are aware of these smoking cessation applications and their opinions about the smartphone apps used in smoking cessation.

## Materials and Methods

A cross-sectional, self-reporting questionnaire-based study was conducted using simple random sampling, to assess the level of knowledge and awareness among the dental and medical practitioners regarding the smartphone mobile applications for smoking cessation (Figure 1).

The content validity of the questionnaire was conducted by a group of dental experts at the university. Then the questionnaires were sent to individual physicians through email, WhatsApp, Twitter, and other social media platforms, which also contained a consent form and an explanation about the study. This study was approved by the ethical committee of Prince Sattam Bin Abdulaziz University, Deanship of Scientific Research.

## Statistical Analysis

Statistical software IBM SPSS, version 27 (IBM Corp., Armonk, NY, USA) was used to perform the statistical analyses. Data were summarized using descriptive statistics by frequencies and percentages. A Chi-square test was used to observe the differences in opinions of smoking cessation apps between smokers and non-smokers among all the participants.

Statistical significance was accepted at  $p < 0.05$ .

## Results

A total of 420 responses were obtained from the dental and medical practitioners (291 males and 129 females). Among all the participants, 46.7% were in the age range of 30-40 years followed by 20-30 years and > 40 years. The professions of participants were divided into four groups and general dental practitioners were the most respondents compared to other practitioners. Among all the participants, 31% were smokers and the rest non-smokers. Surprisingly, only 12.6% of participants were aware of the mobile applications used for smoking cessation. Therefore, most of participants (47.1%) were not sure if these apps were working for smoking cessation or not. Moreover, only 12.4% of participants considered that the smartphone could influence smokers to quit. Nevertheless, the participants had positive thoughts about smartphone apps compared to other methods of smoking cessation procedures. The summary of the questionnaire is displayed in Table I.

The Chi-square's test showed that only 20.8% of participants who were smokers were aware of these smartphone apps, whereas only 9% of non-smoker participants were familiar with the smoking cessation app. Moreover, there was a significant difference ( $p < 0.01$ ) between the smoking status and the awareness of smoking cessation apps available for smokers to quit smoking. A total of 38.5% of smoker participants thought that smartphone apps would be effective to quit smoking and 52.8% of non-smoker participants were not sure about these apps. A significant difference ( $p < 0.01$ ) was found between the smoking status and the judgment about the effectiveness of smoking apps.

Smoking status and the effectiveness of smoking apps among the respondents are shown in Table II.

**Awareness of Current Mobile Apps for Smoking Cessation among the Dental and Medical Practitioners in Saudi Arabia**

**Gender**  
 Male       Female

**What is your age?**  
 20-30       30-40       >40

**Profession**  
 Dental (General practitioner)     Dental (Specialist or Consultant)  
 Medical (General practitioner)     Medical (Specialist or Consultant)

**Are you a current smoker?**  
 Yes       No

**Do you know about different types of smart phone apps available for smokers to quit smoking?**  
 Yes       No

**Do you think smart phone apps are effective for smokers to quit smoking?**  
 Yes       No       Don't know

**Which method among these do you think is the most effective way for smokers to quit?**  
 Nicotine replacement therapy     Smart phone apps       Counselling

**Do you think Nicotine Replacement Therapy like chewing gums and transdermal patch lead to any side effects?**  
 Yes       No       Don't know

**Do you think Smartphone apps have potential to overcome limitations of website and texting messaging interventions?**  
 Yes       No       Don't know

**Do you think smart phone apps are more effective in reaching young people more than the traditional services?**  
 Yes       No       Don't know

**Do you think smart phone apps would be a useful supportive tool to other smoking cessation interventions?**  
 Yes       No       Don't know

**Can E-cigar help an individual who has failed to quit smoking with help of smart phone apps?**  
 Yes       No       Don't know

**Do you think E-cigars are better than Nicotine Replacement Therapy?**  
 Yes       No

**Do you think Nicotine Replacement Therapy is better than personal counselling for tobacco cessation?**  
 Yes       No

**Do you think the smart phone app for quitting smoking will have an effective intervention to promote daily abstinence rates and to reduce daily number of cigarettes smoked?**  
 Yes       No

Figure 1. Self-reported questionnaire.

**Table I.** Summary distribution of the questionnaire response.

Questionnaire variables	Frequency	Percent (%)
<b>Gender</b>		
Male	291	69.30
Female	129	30.7
<b>Age</b>		
20-30	166	39.5
30-40	196	46.7
> 40	58	13.8
<b>Profession</b>		
Dental (General practitioner)	155	36.9
Dental (Specialist or Consultant)	99	23.6
Medical (General practitioner)	67	16
Medical (Specialist or Consultant)	99	23.6
Are you a current smoker?		
Yes	130	31
No	290	69
<b>Do you know about different types of smart phone apps available for smokers to quit smoking?</b>		
Yes	53	12.6
No	367	87.4
<b>Do you think smart phone apps are effective for smokers to quit smoking?</b>		
Yes	124	29.5
No	98	23.3
Don't know	198	47.1
<b>Which method among these do you think is the most effective way for smokers to quit?</b>		
Nicotine replacement therapy	233	53.1
Smartphone apps	52	12.4
Counselling	145	34.5
<b>Do you think Nicotine Replacement Therapy like chewing gums and transdermal patch lead to any side effects?</b>		
Yes	164	39
No	98	23.3
Don't know	158	37.6
<b>Do you think Smartphone apps have potential to overcome limitations of website and texting messaging interventions?</b>		
Yes	215	51.2
No	59	14
Don't know	146	34.8
<b>Do you think smart phone apps are more effective in reaching young people more than the traditional services?</b>		
Yes	323	76.9
No	33	7.9
Don't know	64	15.2
<b>Do you think smart phone apps would be a useful supportive tool to other smoking cessation interventions?</b>		
Yes	278	66.2
No	52	12.4
Don't know	90	21.4
<b>Can E-cigar help an individual who has failed to quit smoking with help of smart phone apps?</b>		
Yes	177	42.1
No	91	21.7
Don't know	152	36.2
<b>Do you think E-cigars are better than Nicotine Replacement Therapy?</b>		
Yes	151	36
No	269	64
<b>Do you think Nicotine Replacement Therapy is better than personal counselling for tobacco cessation?</b>		
Yes	177	42.1
No	243	57.9
<b>Do you think the smart phone app for quitting smoking will have an effective intervention to promote daily abstinence rates and to reduce daily number of cigarettes smoked?</b>		
Yes	310	73.8
No	110	26.2

**Table II.** Smoking status and the effectiveness of smoking apps among the respondents.

Questionnaire variables	Smoking status (%)		$\chi^2$
	Yes	No	
<b>Do you know about different types of smart phone apps available for smokers to quit smoking?</b>			
Yes	20.8	9.0	$p < 0.01^*$
No	79.2	91.0	
<b>Do you think smart phone apps are effective for smokers to quit smoking?</b>			
Yes	38.5	25.5	$p < 0.01^*$
No	26.9	21.7	
Don't know	34.6	52.8	
<b>Which method among these do you think is the most effective way for smokers to quit?</b>			
Nicotine replacement therapy	56.9	51.4	$p < 0.01^*$
Smartphone apps	23.1	7.6	
Counselling	20	41.0	
<b>Do you think Nicotine Replacement Therapy like chewing gums and transdermal patch lead to any side effects?</b>			
Yes	40.8	38.3	$p = 0.695$
No	24.6	22.8	
Don't know	34.6	39.0	
<b>Do you think Smartphone apps have potential to overcome limitations of website and texting messaging interventions?</b>			
Yes	56.9	48.8	$p = 0.290$
No	12.3	14.8	
Don't know	30.8	36.6	
<b>Do you think smart phone apps are more effective in reaching young people more than the traditional services?</b>			
Yes	83.1	74.1	$p = 0.129$
No	6.2	8.6	
Don't know	10.8	17.2	
<b>Do you think smart phone apps would be a useful supportive tool to other smoking cessation interventions?</b>			
Yes	70.8	64.1	$p = 0.211$
No	13.1	12.1	
Don't know	16.2	23.8	
<b>Can E-cigar help an individual who has failed to quit smoking with help of smart phone apps?</b>			
Yes	53.1	37.2	$p < 0.01^*$
No	23.8	20.7	
Don't know	23.1	42.1	
<b>Do you think E-cigars are better than Nicotine Replacement Therapy?</b>			
Yes	47.7	30.7	$p < 0.01^*$
No	52.3	69.3	
<b>Do you think Nicotine Replacement Therapy is better than personal counselling for tobacco cessation?</b>			
Yes	43.1	41.7	$p = 0.795$
No	56.9	58.3	
<b>Do you think the smart phone app for quitting smoking will have an effective intervention to promote daily abstinence rates and to reduce daily number of cigarettes smoked?</b>			
Yes	73.8	73.8	$p = 0.991$
No	26.2	26.2	

%, Percentage;  $\chi^2$ , Chi-square; \*, Significant difference ( $\leq 0.05$ );  $p$ ,  $p$ -value.

## Discussion

Despite various life-threatening consequences of smoking, about 1.1 billion people around

the world persist in this habit which will lead to almost 7 million deaths each year<sup>1</sup>. This preventable disease became a social threat mainly for the young generations. Different chronic health

conditions have been developed among young generation due to this chronic habit<sup>23</sup>. However, many young adults endeavor several times to quit this habit<sup>24</sup>. The public health care system is responsible for providing different aids to stop smoking, especially for those who wish to relinquish<sup>25</sup>. Various methods are available and advanced smartphone application is one of them.

In this present study, a questionnaire about the awareness of mobile apps for the cessation of smoking among dental and medical practitioners was assessed. A total of 420 responses were received, and the majority of the participants were male and in the middle age group (30-40 years). All the participants were from medical and dental backgrounds and their rank was divided into general practitioner and specialist/consultant. Moreover, two-thirds of the participants were non-smokers. The awareness about mobile apps on smoking cessation might differ between smoking and non-smoking participants; therefore, the differences in opinions about smoking cessation apps between smokers and non-smokers among all the participants were further analyzed.

Different mobile applications for smoking cessation are quite famous and have been used for many years. Many studies<sup>25-29</sup> have been conducted on these apps; however, unexpectedly only 12.6% of participants were aware of these mobile apps, and only 20.8% of smoking participants knew them. It was expected that most of the participants who were not smokers may not be aware of the apps; in fact, only 9% knew them. Hence, many of the participants were not sure about the effectiveness of mobile apps in terms of smoking habit cessation. Though many of the smoker participants were not conscious of these apps, most of them considered these apps as an effective tool to reduce the smoking habit. On the other hand, non-smoking participants were not totally sure about the applications. Based on the results, it could be assumed that very few practitioners use these apps or suggest to their patients to use them to quit smoking in Saudi Arabia.

The young generations are generally more into the advanced mobile apps than the middle or older generations. Therefore, this report may differ if the questionnaire was distributed among the medical and dental undergraduate students too. Moreover, including participants from other health practitioners, such as medical and dental assistants or nurses in different fields of health science would have displayed different outcomes. However, the current study aimed at assessing the awareness of smoking cessation apps among professionals only.

Not only different smartphone apps, but also other effective methods, such as NRT and E-cigarettes, are also considered as being beneficial for smoking cessation<sup>30,31</sup>. The social environment is also playing an utmost important role in smoking. A Romanian study<sup>7</sup> stated that teenagers who had been raised in social protection were more prone to immerse in smoking habit than who had been raised in familial environments. Previous studies<sup>32-34</sup> mentioned that switching to E-cigarettes from regular cigarettes would decrease the risk to health. Moreover, it was also stated that E-cigarettes containing nicotine are more effective in smoking cessation compared to nicotine-free E-cigarettes<sup>35</sup>. In this study, it was observed that more than half of the participants contemplated that NRT is the most effective way to aid smokers to quit smoking compared to smartphone apps and counseling. The least of the participants voted for smartphone applications among these three options for smoking cessation. Moreover, the smoking participants anticipated counseling as the least effective method compared to NRT and mobile apps. Though E-cigarette was not included as an option in the question 'Which method among these do you think is the most effective way for smokers to quit?' which could have altered the percentage of responses.

Most of the participants including smoking participants also considered that using NRT in different forms (chewing gum and transdermal patch) could lead to side effects. However, while comparing NRT with E-cigarettes and NRT with personal counseling separately in the questionnaire, most of the participants, including smokers, agreed that NRT was better than E-cigarettes but not than personal counseling. A randomized trial<sup>31</sup> about NRT and E-cigarettes concluded that E-cigarettes are more effective in smoking cessation compared to NRT. However, the current responses<sup>31</sup> from professionals about NRT and E-cigarettes are not following the previous outcome.

On the other hand, smoker participants believed E-cigarettes would be helpful for people who failed to quit smoking with the help of smartphone applications, while most of the non-smokers were not sure about the efficiency of E-cigarettes. The usefulness of using E-cigarettes over traditional cigarettes is still debatable<sup>36</sup>. Though E-cigarettes showed benefits according to some of the studies<sup>36-38</sup>, other studies<sup>39,40</sup> with larger sample sizes reject that hypothesis.

All the participants from both groups agreed about the potency of smartphone apps over web-

sites, text messages, and traditional services. Moreover, regardless of their smoking status, participants agreed that these apps would be supportive tools for smoking cessation. Moreover, the preponderance of the participants appreciated that daily use of these apps could reduce the daily number of cigarettes smoked.

## Conclusions

In conclusion, although smartphone application is one of the accepted methods of smoking cessation, the dental and medical practitioners in Saudi Arabia are not relatively acquainted with these applications.

### Conflict of Interest

The Author declares that he has no conflict of interests.

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The author has no relevant financial or non-financial interests to disclose.

### Ethical Approval

This cross-sectional study was conducted at the College of Dentistry, Prince Sattam Bin Abdulaziz University Alkharj, Saudi Arabia following the "Helsinki Declaration of Human Studies" and approved by the Institutional Review Board (Reference No. REC-HSD-84-2021).

### Informed Consent

Informed consent was obtained from all subjects involved in the study.

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