

## The Prevalence of Smoking Among Medical Residents in Saudi Arabia, A Cross Sectional National Survey

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### ABSTRACT

In this cross-sectional study, we investigated the prevalence of smoking among medical residents. In addition, we explored the knowledge, risk factors, and cessation attempts related to smoking. This was a cross-sectional study conducted through an online questionnaire in Saudi Arabia from November 2020 to December 2020. All resident physicians in Saudi Arabia were eligible to participate in the study. This study used a convenience sample to recruit the study population. The questionnaire was distributed data among residents via google forms. The forms were sent to residents' emails that are registered in the Saudi Commission for Health Specialties Fagerstrom Test for Nicotine Dependence and Lebanon Waterpipe Dependence Scale (LWDS-11) were used in this study. Chi-square comparison of categorical data, ANOVA to compare means of continuous variables were used. Multivariate logistic regression was conducted to verify demographic, lifestyle, work-related factors' effect on smoking habit using FTND and/or LWDS-11 scales. A p-value  $\leq 0.05$  was considered statistically significant. A total of 457 medical residents have participated in this study. Of the 157 participants who reported that they are current smokers, 47.7% reported that they smoke cigarettes. 75.2% of the study sample reported they smoke during working hours. The most commonly reported reasons for starting smoking were to relieve stress and anxiety and/or that it was started as with a trial then continued with 47.1% and 36.9%, respectively. The mean FTND score for the study participants was 0.63 (SD: 1.8). Using multiple linear regression analysis, we found that, older age was associated with having a higher FTND score ( $p=0.009$ ). Male residents were more likely to have higher FTND scores compared to females ( $p< 0.001$ ). This study demonstrates that smoking habit is not uncommon among medical residents, despite their perceived social image and role in smoking prevention and cessation. High level of stressors, anxiety and depression are among the most predisposing factors leading to high prevalence of smoking.

**Keywords:** Smoking, Health care workers, Saudi Arabia, Tobacco, Survey.

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## INTRODUCTION

Tobacco smoking has been established as a preventable cause of health mortality and morbidity<sup>1</sup>. It contributes to multiple cardiac, respiratory, neurological, and malignant diseases. It has a significant burden on the world's economy, public health, and mortality<sup>2</sup>. More than 7 million deaths per year are attributable to smoking, with an expected number exceeding 8 million by 2030<sup>3</sup>. It has been reported that smoking costs globally 6 % of the total health spending which constitutes 10% of gross domestic product (GDP)<sup>4</sup>. Konstantina ko et.al in a study of economic cost in gulf countries reported a total cost of smoking 34.5\$ billion in 2016<sup>5</sup>. Notwithstanding the remarkable burden of smoking, the number of smokers is still on the rise. In Saudi Arabia, a national survey showed the prevalence of 12.2% current smokers, with 21.5% and 1.1% among males and females, respectively<sup>6</sup>. Moreover, a study that investigates the trends of smoking between 1996-2012 showed an almost doubling in the number of male smokers, from 21 % to 37%<sup>7</sup>.

Health care workers (HCW) are considered by the public as role models and community leaders especially when it comes to health and its related habits, albeit smoking is not an uncommon phenomenon among them<sup>8</sup>. The WHO Framework Convention on Tobacco Control focuses on the importance of HCW being role models, specifically, setting an example by not using tobacco<sup>9</sup>. In a systematic review that involved 229 studies of more than sixty countries, the overall prevalence of smoking among HCW was 21%, of which 31% are males and 17% are females<sup>10</sup>. In Arab countries, the prevalence ranges from 8% to 23.1% among HCW<sup>11-13</sup>. In Saudi Arabia, a systematic review reported an overall prevalence of 16-34% among HCW<sup>14</sup>.

To the best of our knowledge, studies evaluating the prevalence of smoking and its predisposing factors among medical residents in Saudi Arabia are scarce. Therefore, in this cross-sectional study, we investigated the prevalence of smoking among medical residents. In addition, we explored the knowledge, risk factors, and cessation attempts related to smoking.

## METHODS

**Study Design and Study Population:** This was a cross-sectional study conducted through an online questionnaire in Saudi Arabia from November 2020 to December 2020. All resident physicians in Saudi Arabia were eligible to participate in the study.

**Study Tool:** Face validity, content validity, and pilot study were conducted to validate the questionnaire. The questionnaire's variables include sociodemographic data, smoking knowledge, behavior toward smoking, smoking history, Fagerstrom Test for Nicotine Dependence (FTND)<sup>15</sup>, and Lebanon Waterpipe Dependence Scale (LWDS-11), were used in this study<sup>16</sup>. FTND is one of the validated tools to assess nicotine addiction, in which there are six items evaluate the number of smoking packs, the compulsion of usage, and dependence. Similarly, LWDS-11 is a tool developed by Salameh et al to rate nicotine dependence but in waterpipe smokers.

**Sampling Procedure:** This study used a convenience sample to recruit the study population. The questionnaire was distributed among residents via google forms. The forms were sent to residents' emails that are registered in the Saudi Commission for Health Specialties. Sample size has been calculated using Raosoft software to achieve a 95% confidence interval with a 5% margin of error. The estimated sample size was 376

**Statistical Analysis:** The statistical analyses were carried out using S.P.S.S. (version 27). Categorical variables were presented as

frequencies and percentages whereas continuous data were expressed as mean  $\pm$  standard deviation. We used chi-square comparison of categorical data, ANOVA to compare means of continuous variables. Multivariate logistic regression was conducted to verify demographic, lifestyle, work-related factors' effect on smoking habit using FTND and/or LWDS-11 scales. A p-value  $\leq$  0.05 was considered statistically significant.

**Ethical Approval:** The Study's IRB has been reviewed and approved by King Abdullah International Medical Research Center (KAIMRC). Consent has been obtained from all participants before filling out the questionnaire. Subject confidentiality has been maintained throughout the research. The data was encrypted with a password and only accessed by the study's investigators.

## RESULTS

**Sociodemographic Characteristics of the Study Sample:** A total of 457 medical residents have participated in this study. More than half of them (61.7%) were males. Around 43.5% were married and the majority of them were residents in the internal medicine program. The majority of the participants were in the first three years of the residency program. Around 44.0% of the participants were doing their residency program in the Western province. One-third (33.5%) of the study participants reported that they are current smokers. Additionally, 26.9% of them reported that they are currently living with a smoker. For further details on the Sociodemographic characteristics of the study sample, refer to Table 1.

**Table 1:** Sociodemographic characteristics of the study sample

Sociodemographic variable	Frequency (%)
Age (mean (SD)) years	28.1 (2.5) years
Gender	
Male	283 (61.9%)
Marital status	
Married	199 (43.5%)
Residency program	
Internal Medicine	112 (24.5%)
Surgery	1 (0.2%)
Paediatrics	32 (6.8%)
Obstetrics and gynaecology	25 (5.5%)
Radiology	20 (4.4%)
Emergency Medicine	25 (5.5%)
Pathology	4 (0.9%)
Psychiatry	8 (1.7%)
Ophthalmology	5 (1.1%)
Neurology	2 (0.4%)
ENT	6 (1.3%)
Urology	7 (1.5%)
Plastic surgery	1 (0.2%)
Cardiac surgery	6 (1.3%)
Orthopaedics	9 (2.0%)
Neurosurgery	7 (1.5%)
Anaesthesia	14 (3.1%)
ICU	12 (2.6%)
Family medicine	105 (23.0%)
Forensic medicine	2 (0.4%)
Others	51 (10.9%)
Level at residency program	
R1	135 (29.5%)
R2	115 (25.2%)

R3	110 (24.1%)
R4	79 (17.3%)
R5	16 (3.5%)
R6	2 (0.4%)
Location of residency program	
Western province	201 (44.0%)
Southern province	68 (14.9%)
Eastern province	125 (27.4%)
Northern province	49 (10.7%)
Central province	14 (3.1%)
Smoking status	
No	272 (59.5%)
Yes, I am currently a smoker	153 (33.5%)
Yes, I am a former smoker	32 (7.0%)
Do you live with a smoker?	
Yes	123 (26.9%)

**Smoking History of the Study Participants:** Of the 157 participants who reported that they are current smokers, 47.7% reported that they smoke cigarettes. The median age at which they started smoking was 21.0 (IQR: 5.0) years. 75.2% of the study sample reported they smoke during working hours. Around half the study sample (52.3%) reported that they have a close family member (father, mother, or a sibling) who is a smoker. The most commonly reported reasons for starting smoking were to relieve stress and anxiety and/or that it was started as with a trial then continued with 47.1% and 36.9%, respectively. More than 62.7% of the smoker participants reported that they have tried to quit smoking without medications assistance. Around half of them reported their longest period of quitting was for a maximum of one month.

**Table 2:** Smoking history of the study participants

Variable	Frequency (%)
What do you smoke? (n= 153)	
Cigarettes	73 (47.7%)
Cigar	3 (2.0%)
Hookah (water pipe)	17 (11.1%)
E-Cigarettes (including vapes)	46 (30.1%)
Shisha	14 (9.2%)
At what age did you start smoking? (Median (IQR)) years	21.0 (5.0) years
Do you smoke during working hours?	
Yes	115 (75.2%)
Do you have close family member (father, mother, or a sibling) who is a smoker?	
Yes	239 (52.3%)
Why did you start smoking? (More than one option could be selected)	
Peer influence	57 (36.3%)
Stress and anxiety reliever	74 (47.1%)
Parenteral influence	7 (4.5%)
Entertainment	58 (36.9%)
Sadness and depression	51 (32.5%)
Started with a trial then continued	62 (39.5%)
To stop stress eating	1 (0.6%)
Work and burnout	1 (0.6%)
No specific reason	19 (12.1%)
Have you tried to quit smoking? (n= 153)	
No	41 (26.8%)
Yes, without medications assistance	96 (62.7%)

Yes, with medications assistance	16 (10.5%)
If you have tried quitting before, what is the longest period of quitting? (n= 153)	
A day or two	29 (19.0%)
2 days to a week	13 (8.5%)
A week to a month	40 (26.1%)
A month to 6 months	44 (28.8%)
More than 6 months	27 (17.6%)
Which of the following is most suitable answer for your situation? (n= 153)	
I want to quit smoking but after 6 months or more	45 (29.4%)
I want to quit smoking now	32 (20.9%)
Not interested in quitting	44 (28.8%)
I don't know	32 (20.9%)

**Participants' knowledge About Smoking:** Most of the participants (76.6%) believed that cigarettes are the most addictive compared to other smoking methods. Around 69.0% of them did believe passive smoking carries the same risk as active smoking. Half of the participants thought that smoking helps in decreasing stress and anxiety. Around one quarter (27.1%) of the study sample believed that vape and E-cigarettes are less harmful than regular cigarettes. Around half the study sample (47.7%) assumed that smoking effects on the body can be reversed once smoking is ceased. More than half the study sample (57.3%) thought that most smokers could stop smoking if they wanted to. Advertisements about the risk of smoking followed by an increase in the price (56.2%), (44.9%) respectively, were the most commonly reported methods participants believed in their effectiveness decreasing the prevalence of smoking.

**Table 3:** Participants' knowledge about smoking

Variable	Frequency (%)
Which of the following is more addictive?	
Cigarettes	350 (76.6%)
Cigar	6 (1.3%)
Hookah (water pipe)	14 (3.1%)
E-Cigarettes (including vapes)	53 (11.6%)
Shisha	34 (7.4%)
Does passive smoking carry the same risk as active smoking?	
Yes	315 (68.9%)
No	122 (26.7%)
I do not know	20 (4.4%)
Does smoking help in decreasing stress and anxiety?	
Yes	231 (50.5%)
No	133 (29.1%)
I do not know	93 (20.4%)
Vape and E-cigarettes are less harmful than regular cigarettes?	
Yes	124 (27.1%)
No	240 (52.5%)
I do not know	93 (20.4%)
Smoking effects on the body can be reversed once smoking is ceased?	
Yes	218 (47.7%)
No	199 (43.5%)
I do not know	40 (8.8%)
Most smokers could stop smoking if they wanted to?	
Yes	262 (57.3%)
No	162 (35.4%)

I do not know	33 (7.2%)
Which method would be most helpful in decreasing the prevalence of smoking? (More than one option could be selected)	
Increasing the price of smoke products	211 (44.9%)
Campaigns	148 (31.5%)
Group therapy	150 (31.9%)
Advertisements about the risk of smoking	264 (56.2%)
Medical insurance restrictions for smokers	180 (38.3%)

**Behavior and Perception Toward Smoking:** The majority of the study sample (77.5%) saw the role of a physician in smoking cessation as of paramount importance. More than half of them agreed physician who smokes are less likely to convenience patients to stop smoking. Only one-third of the study sample agreed they received appropriate training in counseling patients about smoking cessation. The majority of them (79.4%) agreed that smoking should be banned in public places. Around one-quarter of the study sample (26.8%) agreed that physicians are paying enough effort in helping people quit smoking. Around one-third of the study sample agreed they have other things to focus on which are higher priority than helping patients quit smoking. Many of them (76.0%) reported they can list multiple methods for smoking cessation to their patients.

**Table 4:** Behaviour and perception toward smoking

Variable	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
It is your duty as a physician to convince people to stop smoking	44.3%	33.2%	17.4%	3.4%	1.7%
Physician who smokes is less likely to convenience his/her patients to stop smoking	30.4%	27.2%	17.2%	19.4%	5.7%
I received appropriate training in counselling patients about smoking cessation	12.3%	19.1%	25.7%	29.1%	13.6%
Smoking should be banned in public places	56.6%	22.8%	13.2%	3.8%	3.6%
Physicians are paying enough effort in helping people quit smoking	7.9%	18.9%	36.8%	31.3%	5.1%
I have other things to focus on which are higher priority than helping patients quit smoking	13.2%	20.9%	35.1%	26.6%	4.3%
I can list multiple methods for smoking cessation to my patients (% Yes)	76.0%				

**Fagerstrom Test for Nicotine Dependence:** The mean FTND score for the study participants was 0.63 (SD: 1.8). Using multiple linear regression analysis, we found that, older age was associated with having a higher FTND score (p=0.009). Male residents were more likely to have higher FTND scores compared to females (p< 0.001). There was

no significant difference in FTND score for the study participants based on marital status.

**Lebanon Waterpipe Dependence Scale:** The mean LWDS score for the study participants was 1.03 (SD: 3.95). There was no statistically significant difference in LWDS score based on age, gender, or marital status (p>0.05).

## DISCUSSION

Despite the common belief that the physician is healthiest, smoking is not uncommon among health care workers. Our study showed the prevalence of smoking among the resident physicians is about one-third (33.5%) among which cigarettes (47.7%) and vapes (30.1%) were the most common way of smoking. This is considered higher than counterpart physicians in western countries. In United State, the reported prevalence of smoking among physicians was reported to be 1.95%<sup>17</sup>. In Spain, 6.5% of the physician in the secondary healthcare facility reported smoking<sup>18</sup>. In Arab Countries, the reported prevalence is higher than in other continents. In West Bank hospital, Palestine, the reported frequency of smoking is about 60.3%<sup>19</sup>. similarly, in Jordan, the estimated prevalence of tobacco smoking was 65%<sup>20</sup>. In Saudi Arabia, few studies had investigated the frequency of smoking among health care workers in general and residents in specific. One study investigated the smoking habit among physicians in Riyadh city, found the prevalence to be around 34%<sup>21</sup>.

There are multiple factors predispose the person to start smoking, including peer pressure, anxiety and stress, workload, depression, and parenteral influence<sup>22</sup>. Our study showed smoking trial and stress are the most common reasons for starting smoking. The majority of smokers in our study do smoke during working hours, most probably as a way to cope with stressors. Resident, among other physicians, is considered to be at a high level of stress, hence smoking would be more prevalent among them. Alshahrani.A. et al reported 50% of smokers in their study were residents<sup>21</sup>.

Nicotine addiction is the impediment majority of smokers face. A study showed a majority of participants wanted to quit smoking, albeit only 6% make it through nicotine addiction<sup>23</sup>. In our study, the mean score for FTND was 0.63, with male gender and older age being the most significant factors of nicotine dependence. This is in line with a recent study that investigated the brain of both male and female smokers using nuclear imaging (PET). Interestingly, unlike women, the dopamine center (a reward center) is strongly activated in men smokers<sup>24</sup>. The majority of our participants (73.2%) are willing to quit smoking, however, most of them failed to keep it for more than 6 months. Despite the aforementioned, the majority of the participants were still willing to quit smoking in the near future.

Cigarette smoking being more addictive than E-Cigarettes is one of the misconceptions among our participants. A study showed that nicotine dependence using an e-cigarette was over two times higher than regular cigarettes<sup>25</sup>. Passive smoking is as harmful as active smoking. Recently, the International Agency for Research on Cancer (IARC) estimated the risk of lung cancer, based on a review of more than 50 studies about passive smoking, to be around 30% for men and 20% for women<sup>25</sup>. The majority of our participants were aware about the risk of passive smoking.

Smoking prevention and cessation are a shared responsibility starting from the policy makers to the health care workers. Physician plays an integral role in escalating the process of smoking cessation, helping with relapses, providing medications help to go through the

nicotine cravings. The majority of participants do believe that the physician has a role in convincing people to stop smoking. Despite the aforementioned, 42% of them had not received training about smoking counseling. This would highlight a major area of improvement for the next generation of doctors as previously stressed out in the study done at Switzerland hospital where they found the majority of the patients received insufficient counseling about smoking habits and cessation<sup>26</sup>. There are multiple methods for smoking cessation that could be applied on the public and individual levels. A systematic review of the most effective cessation method of smoking found that nicotine replacement therapy and varenicline with education are the most effective<sup>27</sup>. However, the majority of our participants do believe increasing price and advertisement are the most effective ways to help decrease the prevalence of smoking.

In the recent years, Saudi Arabia has taken a huge step in fighting smoking with the taxation of smoking, restricting smoking in public places, and holding multiple awareness campaigns. This points us to the need of implanting strict laws, regulations, and smoking control rules. However, future research including behavioral research on a larger scale of smoking among health care workers and the public are required. Training the junior physicians about smoking counseling and prevention is paramount.

The strength of our study comes from the selected population, residents, which is not the prime focus of the studies that address the prevalence of smoking among HCW in Saudi Arabia. The importance of this generation is of great value as they are the ones who project the image to the health care users in specific and public in general. Moreover, this generation would be a key factor for fighting smoking in the future if they were equipped with the best training on smoking counseling. Lastly, most of the health campaign's volunteers are usually from residents and medical students.

Selection bias is one of the limitations of the study, giving the convenience sampling method used and tendency of the people who are aware of the problem to participate the most. Self-reporting of smoking habits, which is likely to be underestimated, added an information bias. In addition, giving the nature of convenience sampling, the generalizability of the result may be affected, especially in surgical specialty which constituted small number of participants in our study.

## CONCLUSION

**This study demonstrates that smoking habit is not uncommon among medical residents, despite their perceived social image and role in smoking prevention and cessation. High level of stressors, anxiety and depression are among the most predisposing factors leading to high prevalence of smoking.**

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**Competing interest:** All authors declare no competing interest.

**Institutional review board statement:** The Study's IRB has been reviewed and approved by King Abdullah International Medical Research Center (KAIMRC).

**Informed consent statement:** Consent has been obtained from all participants before filling out the questionnaire. Subject confidentiality has been maintained throughout the research.

**Data Availability Statement:** Data sharing is not applicable to this article.

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**Competing Interest:** None

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