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Effects of covid-19 pandemic on smoking behavior among Saudi postgraduate physicians

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ABSTRACT

The COVID-19 pandemic has sparked global stress. This has altered people's coping mechanisms, with some turning to harmful smoking as an option. Smoking is highly prevalent among Saudi healthcare workers, particularly postgraduate physicians. Therefore, it is critical to comprehend the smoking factors among Saudi postgraduate physicians and how COVID-19 affects their smoking status. This cross-sectional study used a self-administered questionnaire to collect data from postgraduate physicians across Saudi Arabia. Data from questionnaires were collected and analyzed using descriptive statistics, Pearson Chi-square test, and multivariate and multinomial logistic regression. Of the 740 participants, 27.6% were smokers and 11.6% were former smokers. Cigarette smoking was the most prevalent type, followed by electronic cigarettes and Shisha (51.0%, 47.1%, and 37.3%, respectively). Smoking was found to be associated ($P < 0.05$) with age over 30, male gender, father and mother smoking, as well as smoking brothers, friends, and smokers' less educated mothers. Despite COVID-19, most smoking postgraduate physicians smoke at their average rates, followed by those who smoke more than their average. Educational and training programs should include appropriate, healthy coping techniques. Furthermore, the associated factors of smoking could help in developing appropriate tobacco-control programs to prevent smoking among postgraduate physicians.

Keywords: COVID-19; Smoking; E-Cigarette; Stress; Coping; Physician; Postgraduate; Saudi Arabia

1. INTRODUCTION

COVID-19 pandemic is caused by the SARS-CoV-2 virus (Li et al., 2020). In response to the pandemic, Saudi Arabia imposed a nationwide lockdown beginning March 23, 2020 and lasting approximately three months (Aljunaid et al., 2022; Alqahtani et al., 2021). The pandemic and its related lockdown caused several physical, social, economic, and psychological effects (Carreras et al., 2021). While most research focused on understanding the social, physical, and economic effects, the psychological effects were not well explored in some places. The common psychological effects include depression, anxiety, distress, irritability, and insomnia (Alzahrani et al., 2022).

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Globally, people's lifestyles changed as a coping mechanism with the effects of the pandemic and the lockdown's consequences (Carreras et al., 2021). Some people resorted to smoking or increasing their smoking levels as a stress reliever from the lockdown, while others who were smoking quit smoking due to the health fears brought about by the COVID-19 disease (Algabbani et al., 2018).

Tobacco smoking is a major public health issue; it is a major cause of morbidity and mortality, as well as a major risk factor for the development of chronic diseases such as cardiovascular and pulmonary disease (Alshahrani et al., 2020). Previous studies have shown that smoking was found to be much more prevalent among healthcare providers compared to the general population (Ficarra et al., 2011; Josseran et al., 2005). Healthcare providers have a vital role in controlling tobacco smoking (Alsaqry et al., 2018). Physicians are responsible for giving advice and education about smoking cessation. Physicians are additionally considered role models in the community, and their behavior towards smoking can directly affect smoking cessation (Al Ghobain et al., 2018; Khalifah et al., 2021; Helal & El-Awady, 2022). In Saudi Arabia, there is a dearth of evidence in the exploration of the trend of smoking among physicians and the influence of COVID-19 on this trend. Given the fact that COVID-19 pandemic might linger on for some time, there is a need to understand the changes in lifestyle that occur as a result of this pandemic. This understanding will propel the appropriate design of effective programs that promote suitable behavioral coping mechanisms. Generally, understanding the linkage of COVID-19 (and other stress factors) facilitates the design of effective public health interventions.

Therefore, this study aims to explore the effect of the COVID-19 pandemic on smoking status among Saudi postgraduate physicians and the factors associated with tobacco smoking during the pandemic. The objectives of this study are; a) to assess the distribution and patterns of tobacco smoking among Saudi postgraduate physicians; b) to determine factors associated with tobacco smoking among Saudi postgraduate physicians, and; c) to demonstrate the effect of the COVID-19 pandemic on smoking status among Saudi postgraduate physicians.

2. MATERIALS AND METHODS

Study Design

This was a cross-sectional survey conducted on postgraduate physicians, who are under training in Saudi Board programs. A questionnaire was developed after a literature review at Medline using terms like 'smoking,' 'tobacco,' 'COVID-19,' and 'survey,' and an expert consultation using the SurveyMonkey platform. Due to COVID-19-related constraints, this study employed a convenience sampling technique. From March 20 to April 28, 2022, the Saudi Commission for Health Specialties (SCFHS) helped us distribute the survey link to postgraduate trainees in all SCFHS-accredited centers (over 700 accredited centers) in Saudi Arabia. This study was limited to current postgraduate trainees in SCFHS programs. This study was ethically reviewed and approved by the Research Ethics Committee No. [H-01-R-012], King Fahad Medical City [IRB Log No. 21-512E]. Informed consent was obtained from each trainee before participating in this study. The survey took, on average, about three to four minutes to complete. Based on a review of the literature, the average estimated smoking rate among current smokers is 14% (Wali, 2011; Mahfouz et al., 2013), with a precision of 5% at a 95% confidence level and a design effect for the cluster sampling technique of 2, assuming that there are 10,000 residents in Saudi Arabia as a whole. This means that a total sample of 364 postgraduate physicians is needed. The sample size was calculated using Epi-Info 7 software based on the listed parameters with probability selection with replacement approach.

Measures

The questionnaire was structured, self-administered, and contained closed-ended questions. It was developed in response to the findings of several previous studies on smoking among healthcare providers (Wali, 2011; Mahfouz et al., 2013). The questionnaire was then tailored to Saudi smokers and pilot tested to ensure its validity. A language expert was consulted to ensure the accuracy of the survey questions. The survey was introduced in Arabic and English to make data collection more convenient. The survey was piloted with a small group to validate it. The questionnaire was divided into five sections. The first section summarized the study's goals, outcomes, and what it took to participate in the survey, and it concluded with an informed consent declaration to proceed. The second section contained information about the participants' socio-demographics as well as their parents' education and jobs. The third section asked participants about their smoking habits, such as their smoking patterns, duration, and intensity. In the fourth section, respondents were asked about their reasons for smoking as well as other social and personal factors such as long working hours, being on-call, vacation, having a family history of smoking, and having relatives or friends who smoke. In the final section, participants were asked about the effect of COVID-19 on their average smoking habits.

Data Analysis

Data were extracted, revised, coded, and entered into IBM SPSS version 22 (SPSS, Inc., Chicago, IL) statistical software. All statistical analysis was done using two-tailed tests, and a P value less than 0.05 was statistically significant. A descriptive analysis based on frequency and percent distribution was conducted for all variables, including trainees' socio-demographic data, smoking status, and smoking patterns with smoking behavior. Crosstabulation was used to compare smoker and non-smoker trainees for all socio-demographic data and smoking-related data. Relationships between variables were tested using the Pearson Chi-square test and an exact probability test for small frequency distributions. Subsequently, all variables with a statistically significant association with the dependent variable (smoking) were included in the multiple predictive models based on the backward stepwise method with a P-value of <0.05 as an entry criterion and a P-value of > 0.05 as an exclusion criterion. Multiple logistic regression analyses were used to estimate adjusted odds ratios (OR_a) and their 95% confidence intervals (95% CI) for the association of postgraduate smoking with the predictors. The obtained predictors from a stepwise model were entered into a multivariate logistic regression model while controlling for age, sex, trainee's level, and parents' education as possible known confounders. Finally, to identify the predictors for the effect of the COVID-19 pandemic on smoking status among postgraduate physicians in Saudi Arabia, multinomial logistic regression was used where postgraduate physicians with the same average level of smoking were the reference outcome group.

3. RESULTS

A total of 740 trainees completed the study questionnaire. Trainee ages ranged from 24 to 55 years, with a mean age of 30.2 ± 3.9 years. As shown in Table 1, of the total participants, 204 (27.6%) were current smokers; 84 (11.4%) were former smokers,and; 452 (61.1%) never smoked. Cigarette smoking was the most prevalent type (51.0%), followed by electronic cigarettes (47.1%) and Shisha (37.3%), while 28 (13.7%) of the participants smoked both cigarettes and electronic cigarettes. A total of 104 (51%) of the participants reported smoking 1–5 times daily, while 44 (21.6%) smoked 6–10 times. Also, 72 (35.3%) of the participants smoked for more than 10 years, while 76 (37.3%) smoked for 1–5 years. 148 (72.5%) of the participants reported smoking during exams; 64 (31.4%) during holidays; 52 (25.5%) during long working hours; and 48 (23.5%) when on-call. A total of 184 (90.2%) of the participants started smoking before residency. As for the reasons for smoking or consuming tobacco, the most reported were psychological relief (41.2%), followed by leisure (15.7%), work pressure (15.7%), imitating others (3.9%), relative/friend pressure (3.9%), and 2% reported for advertisements (Table 1).

Table 1 Smoking characteristics of the postgraduate physicians in Saudi Arabia.

Smoking pattern	No	%
Prevalence of smoking		
Current smoker	204	27.6%
Former smoker	84	11.4%
Never Smoker	452	61.1%
Type of smoking among current smokers		
Cigarette	104	51.0%
Shisha	76	37.3%
Electronic cigarette or vape	96	47.1%
Both cigarettes & electronic	28	13.7%
How many times do you smoke (or consume tobacco) per day?		
1-5	104	51.0%
6-10	44	21.6%
> 10	56	27.5%
Duration of smoking (or consuming tobacco) in years		
1-5	76	37.3%
6-10	56	27.5%

> 10	72	35.3%
I smoke (or consume tobacco) more than my daily average when I have		
Exams	148	72.5%
Holidays	64	31.4%
Long working hours	52	25.5%
On-calls	48	23.5%
Others	12	5.9%
Have you started smoking (or consuming tobacco) before or during residency?		
Before residency	184	90.2%
During residency	20	9.8%
The most important reasons for smoking or consuming tobacco		
Psychological relief	84	41.2%
Leisure	32	15.7%
Work pressure	32	15.7%
Imitating others	8	3.9%
Relatives/friends pressure	8	3.9%
Others	36	17.6%

As indicated in Table 2, of the participants aged under 30 years, 71 (19.3%) were current smokers, and 297 (80.7%) were non-smokers. Of the participants aged 30 years and above, 133 (35.8%) were current smokers, while 239 (64.2%) were non-smokers. Of the male participants, 144 (35%) were current smokers, while 268 (65%) were non-smokers. Of the female participants, 60 (18.3%) were current smokers, and 268 (81.7%) were non-smokers. Of the singles (non-marrieds), 112 (28.9%) were current smokers and 276 (71.1%) were non-smokers. Of the married participants, 92 (26.1%) were current smokers, and 260 (73.9%) were non-smokers. Of the junior postgraduate physicians, 80 (27%) of the participants were current smokers, and 216 (73%) were non-smokers. Of the senior resident participants, 124 (27.9%) of them were current smokers, and 320 (72.1%) were non-smokers.

Additionally, as indicated in Table 2, cross-tabulation was used to compare smoker and non-smoker trainees for all socio-demographic, family, and friend-related data. Relations were tested using the Pearson Chi-square test and the exact probability test for small frequency distributions. Age, gender, mother's education, and having smoking parents, brothers, and friends were the significant determinants of participants' smoking status ($p < 0.5$).

Table 2 Determinants of participants' smoking status and socio-demographic characteristics by Chi-square test

Socio-demographic data	Smoking status				P-value
	Current smoker		Ex / non-smoker		
	No	%	No	%	
Age in Years					
< 30	71	19.3%	297	80.7%	.001*
≥ 30	133	35.8%	239	64.2%	
Gender					
Male	144	35.0%	268	65.0%	.001*
Female	60	18.3%	268	81.7%	
Marital Status					.407

Single	112	28.9%	276	71.1%	
Married	92	26.1%	260	73.9%	
Residency training level					
Junior	80	27.0%	216	73.0%	.788
Senior	124	27.9%	320	72.1%	
Father's Education					
Intermediate / less	36	29.5%	86	70.5%	.833
Secondary	40	28.2%	102	71.8%	
University / above	128	26.9%	348	73.1%	
Mother's Education					
Intermediate / less	79	35.6%	143	64.4%	.002*
Secondary	35	19.9%	141	80.1%	
University / above	90	26.3%	252	73.7%	
Father's Occupation					
None	20	35.7%	36	64.3%	
Employee	32	20.5%	124	79.5%	.089$
Self-employed	12	25.0%	36	75.0%	
Retired	140	29.2%	340	70.8%	
Mother's Occupation					
None	112	27.7%	292	72.3%	
Employee	24	24.0%	76	76.0%	.739
Self-employed	12	33.3%	24	66.7%	
Retired	56	28.0%	144	72.0%	
Father smoking					
Yes	56	48.3%	60	51.7%	.001*
No	148	23.7%	476	76.3%	
Mother smoking					
Yes	24	66.7%	12	33.3%	.001*
No	180	25.6%	524	74.4%	
Brother smoking					
Yes	140	42.2%	192	57.8%	.001*
No	64	15.7%	344	84.3%	
Sister smoking					
Yes	20	33.3%	40	66.7%	.297
No	184	27.1%	496	72.9%	
Friend smoking					
Yes	164	37.6%	272	62.4%	.001*
No	40	13.2%	264	86.8%	

P: Pearson X^2 test $: Exact probability test * P < 0.05 (significant)

As shown in Table 3, the multiple logistic regression analyses were used to estimate adjusted odds ratios (OR_a) and their 95% confidence intervals (95% CI) for the association of postgraduate physicians' smoking with the predictors. Being a smoker aged 30 years and above (OR_a= 2.6, 95% CI = 1.6-4.1), male (OR_a= 2.5, 95% CI =1.7-3.9), with low mother's education level (OR_a=1.4, 95%

CI=1.2-4.6), with father smoking (OR_a=3.6, 95% CI=1.01-12.5), with mother smoking (OR_a= 3.7, 95% CI= 1.6-8.5), with brother smoking (OR_a = 3.1, 95% CI = 2.1-4.9), and with friend smoking (OR_a=2.9, 95% CI = 1.8-5.1) were the most significant positive predictors for smoking, keeping all other factors constant.

Table 3 Multiple logistic regression for predictors among postgraduate physicians in Saudi Arabia.

Predictors	P-value	OR_a	95% C. I	
			Lower	Upper
Age above 30 vs. below 30 years	.001	2.6	1.6	4.1
Male vs. female trainee	.001	2.5	1.7	3.9
Low mother education vs. others	.002	1.4	1.2	4.6
Father smoking	.045	3.6	1.01	12.5
Mother smoking	.002	3.7	1.6	8.5
Brother smoking	.001	3.1	2.1	4.9
Friend smoking	.001	2.9	1.8	5.1

OR_a: Adjusted odds ratio CI: Confidence interval * P < 0.05 (significant)

Figure 1 shows the effect of the COVID-19 pandemic on the smoking status of the participants. The majority (51.4%) of the participants smoked as their average, followed by the participants who smoked more than their average (29.2%), and lastly, the participants who reported smoking less than their average (19.4%).

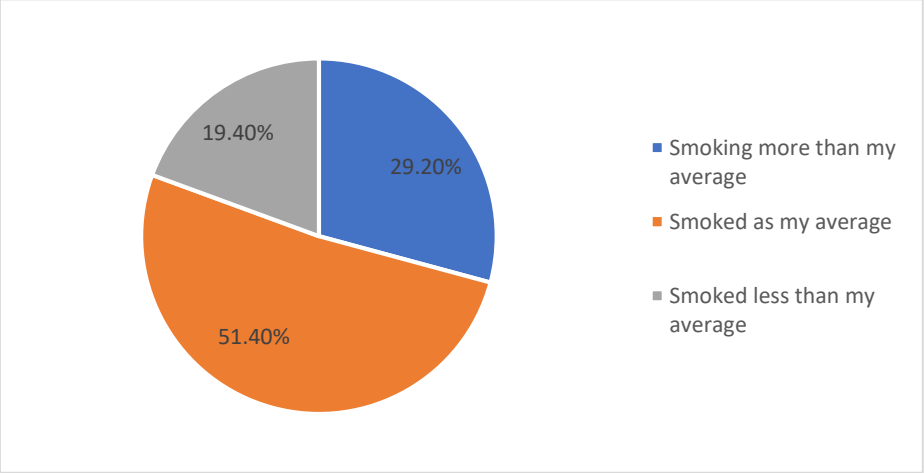

Figure 1 Effect of COVID-19 pandemic on smoking status among participants.

Multinomial logistic regression was used to identify the predictors for the effect of the COVID-19 pandemic on smoking status among the participants (Table 4). Participants with the same average level of smoking were the reference outcome group. A combination of age less than 30 (P =.017), male gender (P =.021), mother's education (P =.005), and mother's employment status (P =.001) significantly predicted the participants' smoking beyond the average. Subsequently, a combination of age less than 30 (P =.006), male gender (P =.002), junior residency level (P =.006), father's employment (P =.037), and mother's employment (P =.001) significantly predicted the participants' smoking below average.

Table 4 Multinomial logistic regression for predictors of the effects of COVID-19 pandemic on smoking status among postgraduate physicians in Saudi Arabia

During COVID-19 crisis, I?	Factors	P-value	OR	95% CI	
				Lower Bound	Upper Bound
Smoked more than my average	Age < 30 years	.017*	3.4	1.2	9.5
	Male gender	.021*	0.3	0.1	0.8
	Unmarried	.940	1.0	0.4	2.5
	Junior trainees	.206	0.6	0.3	1.3
	Intermediate / below F. education	.283	2.1	0.5	8.0
	Secondary father education	.166	2.2	0.7	6.6
	Intermediate / below M. education	.005*	0.2	0.1	0.6
	Secondary mother education	.201	0.5	0.2	1.4
	Working father	.837	0.9	0.3	2.4
	Working mother	.001*	0.1	0.0	0.3
Smoked less than my average	Age < 30 years	.006*	4.5	1.5	13.3
	Male gender	.002*	0.2	0.1	0.5
	Unmarried	.544	0.8	0.3	1.9
	Junior trainees	.006*	0.3	0.1	0.7
	Intermediate / below F. education	.568	1.4	0.5	4.1
	Secondary father education	.089	0.3	0.1	1.2
	Intermediate / below M. education	.736	1.2	0.4	3.7
	Secondary mother education	.539	0.7	0.2	2.3
	Working father	.037*	3.3	1.1	10.4
	Working mother	.001*	1.9	1.1	5.4

OR: Odds ratio CI: Confidence interval * P < 0.05 (significant)

4. DISCUSSION

This cross-sectional study was conducted among postgraduate physicians from all specialties in all Saudi board programs offered by the Saudi Commission for Health Specialties (SCFHS). The findings provide a glimpse of smoking behaviors in relation to stress factors like the COVID-19 pandemic. As per this study, current smokers stand at 27.6%, former smokers at 11.4%, and non-smokers at 61.1%. Therefore, 27.6% of the postgraduate physicians in Saudi Arabia are smokers. This observation is comparable to the findings in two studies in Saudi Arabia that were localized to Riyadh city that found the prevalence of smoking to be 34.1% among both health workers and physicians (Shaikh & Aljuraiban, 2019; Al Shahrani, 2019). However, these studies were conducted before the COVID-19 outbreak, implying that the current prevalence was confounded by some other factors that need to be explored. Otherwise, it might be true that the COVID-19 pandemic influenced the reduction in smoking because smoking was highly attributed to the SARS-CoV-2 vulnerability. Consequently, Al Ghadban et al., (2022) assert that stress from COVID-19 caused

behavior changes that led to either an increase or decrease in smoking patterns. The findings from these authors' study show that an equal proportion of participants reported increasing or decreasing their smoking because of the COVID-19 pandemic.

The majority of the smoking participants smoked cigarettes (51%) followed by electronic cigarettes (47.1%), and Shisha (37.3%). This observation is consistent with the findings in the studies by Ghadban et al., (2022) within the Beirut community and Alfaraj et al., (2019) among adults in the Eastern province of Saudi Arabia. While there is no solid rationale for this observation, it can be attributed to the perceived danger associated with different types of smoking. The majority of smokers know that electronic smoking (vaping) is more dangerous than traditional smoking (Alfaraj et al., 2019). Nevertheless, any kind of smoking is dangerous to the body. Evidence shows that electronic smoking contains nicotine, which is associated with long-term effects on cardiac and respiratory diseases just like traditional smoking does, which contains nitric oxide, which has significant effects on heart rate and blood pressure (Alfaraj et al., 2019). Many of these smokers were aged 30 years and above (133/204), males (144/204), single (112/204), and senior postgraduate physicians (124/204). Additionally, only three determinants of smoking were statistically significant in our study. These determinants are age (P = .001), gender (P = .001), and mother's education (P = .002). Participants who were older than 30 years were found to be more likely to smoke compared to those under 30 years. Additionally, the male participants were found to be more likely to smoke compared to their female counterparts. Also, participants who reported having a low mother's education were more likely to smoke compared to participants who reported having a high mother's education.

Previous studies agree with these observations (Shaikh & Aljuraiban, 2019; Al-Zalabani and Kasim, 2015; Al-Kaabba et al., 2011), and found males smoke more than females, as well as smoking to increase with increasing age. Although community gender construction can reliably justify the gender difference in smoking, where in most countries, males smoke more than females (Shaikh & Aljuraiban, 2019), it might be assumed that being male and increasing age are subject to more stressors, hence creating this observed difference as stress coping mechanisms. Indeed, the majority of the participants in this study smoked because they needed psychological relief (41.2%) and mostly during exams (72.5%). Many of the smoking participants reported smoking 1 to 5 times a day (51%), having smoked for 1 to 5 years (37.3%). Of these smokers, 51.4% reported smoking within their average smoking rate, while 29.2% reported smoking above their average smoking rate. Just as smoking many cigarettes, smoking only one cigarette per day or even for a short duration carries a risk of developing coronary heart disease and stroke (Alkhormi et al., 2022). It is important for people to know that no greater amount of cigarette smoking for a certain duration is worse off than the other. Hackshaw et al., (2018) demonstrated that a large proportion of the risk of coronary heart disease and stroke comes from smoking only a few cigarettes. As a result, there is an urgent need to develop effective behavioral change programs that take into account the stressors that people face.

This study further demonstrates that the risk for people to smoke significantly increases with increasing age, low mother's education, and with smoking from any of the following: father, mother, brother, sister, or friend. These people make up the social network of an individual, hence, peer or social influence. If a parent, sibling, or even a friend smokes, the individual will have a low perception of harmor may be influenced to begin or continue smoking because others do. Understanding the role of social networks is fundamental to addressing the smoking problem among postgraduate physicians in Saudi Arabia. In addition to the social network, the parents' education level plays a significant role in determining whether an individual will start or maintain smoking. The more educated the parents are, the higher the chances that the individual will either not start smoking or easily quit smoking (Al-Zalabani and Kasim, 2015).

While the smoking prevalence in this study stands at 27.6% among the postgraduate residents, smoking in the adolescent population of Saudi Arabia has previously been reported to stand at 15.2% (Al-Zalabani and Kasim, 2015). Additionally, the total prevalence of tobacco use among young people and adults stands at 14.9% and 12.2%, respectively (Itumalla and Aldhmadi, 2020; Alkhormi et al., 2021). Therefore, the smoking rate among healthcare workers is higher than that of the general population. To avoid additional effects on patients seeking treatment from hospitals because of indirect smoking, there is a need to create strategies against the high smoking rate among healthcare workers.

This study finds its strength in the cross-sectional study design that gave an opportunity for the recruitment of all possible participants. Furthermore, this study was conducted in the middle of the COVID-19 pandemic, revealing the true effect of COVID-19 on smoking. This study analyzed findings from both smokers and non-smokers. Since the study objectives were largely focused on smokers, some of the general conclusions could have been affected by the inclusion of the non-smokers. There is a need to conduct a study that only covers current smokers.

5. CONCLUSION

Cigarette and electronic cigarette smoking is relatively high among Saudi postgraduate physicians. The majority of them smoke more during exams to relieve stress. In the studied physicians, being male, above 30, having smoking parents, brothers, friends, and mothers with low education are associated with increased risk factors for smoking. Despite the COVID-19 pandemic, the majority of smoking physicians continued to smoke at their average levels, followed by those who smoked more than their average. Appropriate, healthy coping techniques are recommended for use in educational and training programs.

Author Contributions

Conceptualization, A.M.A.; methodology, A.M.A.; software, A.M.A.; validation, A.M.A. and S.S.A.; formal analysis, A.M.A.; investigation and data collection, A.M.A., N.Z.A and N.H.A.; resources, A.M.A.; data curation, A.M.A.; writing—original draft preparation, A.M.A.; review, A.M.A., S.S.A., N.Z.A. and N.H.A.; writing—final review and editing, A.M.A.; visualization, A.M.A.; supervision, S.S.A; project administration, A.M.A. All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement

This research was ethically reviewed, and approval was granted by the Research Ethics Committee [H-01-R-012], King Fahad Medical City, Riyadh, Saudi Arabia. [IRB Log No. 21-512E].

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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