



Profile of Smokers Seeking Treatment at Smoking Cessation Clinics Al-Qassim Region, Saudi Arabia

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ABSTRACT

Background: According to WHO and the Saudi Ministry of Health, smokers who seek treatment at a smoking cessation clinic in the Al-Qassim Region are more likely to be smokers than nonsmokers. **Objectives:** To describe socio-demographic and clinical factors of smokers seeking smoking cessation in the smoking cessation clinic in Qassim region, Saudi Arabia and to identify the factors associated with nicotine dependence among smokers attending the clinic. **Methods:** A retrospective record-based descriptive and analytic study was conducted. Secondary data on attendees of smoking cessation clinics in Al-Qassim Region were collected. It included those who are registered and attended Smoking Cessation Program between January 1st, 2018, and December 31st, 2019. Logistic regression analysis was run to detect independent risk factors. **Results:** A total of 504 smokers visited the smoking cessation clinics in Al-Qassim region, 99.8% were males, 47.8% were governmental employees, and 45.6% had no income. Most smokers (94%) have no co-morbidities. Cigarette smoking was the most common tobacco form (98%). The mean Fagerström test score was 5.4± 2.6; the average number of cigarettes per day was 22.60±8.79, and the average starting age of smoking was 17.1±3.2 years. The majority (94%) of the smokers received pharmacotherapy. Nicotine dependence was significantly higher in smokers with a higher monthly income and those who smoked more than 20 cigarettes per day. **Conclusions:** Smokers seeking smoking cessation assistance demonstrated a high level of nicotine dependence (45.6%). Smoking control interventions must consider the characteristics of smokers treated through the public health care system.

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INTRODUCTION

One of the most serious public health issues is smoking. Globally, nearly 23% of adults smoke tobacco products, including more than one billion men and 250 million women.¹ Tobacco was identified by the World Health Organization as the second leading cause of death worldwide.¹ According to the World Health Organization, tobacco use is currently responsible for the death of one in every ten adults worldwide, with an estimated ⁵ million deaths per year. Furthermore, unless circumstances change, the predicted death toll in the next 25 years

will nearly double; millions more will develop tobacco-related illnesses prematurely, leading to chronic disability.² Tobacco is a known factor that predisposes smokers to many disorders that lead to death or disability, in addition to its negative social and economic affects.³ Smoking has been shown to significantly increase the risk of developing a number of chronic illnesses, such as lung cancer, heart disease, and pulmonary disease. Implementing smoking cessation strategies would thus help to reduce the burden of these diseases.¹ Over the past

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Table (1): Demographic & clinical factors of study participants at smoking cessation clinics, Al-Qassim region, Saudi Arabia (2018-2019)

Variable	n (n=504)	%
Age Group		
10-≤15	5	1.0
16≤20	77	15.3
21≤25	94	18.7
26≤30	111	22.0
31≤40	116	23.0
41≤50	65	12.9
51≤60	28	5.6
> 60	8	1.6
Gender		
Female	1	0.2
Male	503	99.8
Working Status		
Business	2	0.4
Free	42	8.3
Gov. Employee	241	47.8
Others	21	4.2
Private Sector	39	7.7
Retired	6	1.2
Student	153	30.4
Monthly income (Saudi Riyals)		
3,000-5,999	98	19.4
6,000-10,000	127	25.2
less than 3,000	37	7.3
More than 10,000	12	2.4
No income	230	45.6
Education Level		
Illiterate	3	0.6
Primary grade	3	0.6
preparatory grade	2	0.4
Higher School	98	19.4
Diploma	254	50.4
Bachelor	79	15.7
Master	3	0.6
Doctorate	5	1.0
Others	57	11.3
Co-morbidity		
Cardiovascular diseases		
Hypercholesteremia	27	5.4
Respiratory diseases	23	4.6
	17	3.4

Others= mean who refuses to inform of his work or his educational level

30 years, Saudi Arabia has implemented several policies to reduce tobacco use, including raising tobacco prices in June 2017 and declaring smoke-free zones in government buildings, schools, and other public gathering places like malls and parks. To run programs to help smokers stop, the Saudi government also established nonprofit government tobacco cessation centers.⁴

Researchers have acknowledged that, despite the Kingdom of Saudi Arabia's (KSA) enormous efforts to combat tobacco use, the prevalence of tobacco use is alarming and calls for immediate action from

Saudi policymakers and medical professionals. For instance, two national surveys conducted in 2013 and 2018 found that 12.2% and 21.4%, respectively, of Saudi citizens smoked tobacco. The prevalence of tobacco use increased by 9.2% over a five-year period⁵

Many approaches have been used to help people quit smoking. It has been demonstrated that the biopsychosocial approach increases the rate of smoking cessation. Both pharmaceutical and non-pharmacological interventions are used in this strategy. Nicotine Replacement Therapy (NRT), bupropion, and varenicline (Champix/Chantix) are examples of pharmacological treatments. Non-pharmacological interventions include both positive and negative environmental factors that may influence treatment effectiveness. Several studies have shown that combining pharmacological approaches with supportive interventions has a significant impact on successful quitting of smoking. One of these studies found that the likelihood of quitting increased from 70% to 100% in the Kingdom of Saudi Arabia (KSA).¹

Given the increasing burden of smoking on the Saudi population, besides preliminary data about smoking habits and smoking cessation behavior in the Qassim region, it has been found that little work has been done in this field. The current study's main goal was to determine sociodemographic characteristics, smoking-related factors, and smoking cessation patterns in Saudi residents living in Al-Qassim, the Kingdom of Saudi Arabia's middle region, and seeking treatment at smoking cessation clinics there. The study's secondary goal was to assess the socio-demographic correlates and smoking-related factors of nicotine dependence among the study participants.

The study objective was to describe socio-demographic and clinical factors of smokers seeking smoking cessation in the smoking cessation clinic in Qassim region, Saudi Arabia. Additionally, to identify factors associated with nicotine dependence among smokers attending the clinic. Based on the finding, the authors will state recommendations for smoking cessation programs in Saudi Arabia.

METHOD

A retrospective record-based descriptive and analytical studies were applied, where excel-extracted reports from the electronic reporting system of smoking cessation clinics (Smoking Cessation Program), Al-Qassim Health Cluster, Ministry of health (MOH), Saudi Arabia).

Table (2): Smoking related variables among study participants

Variable	N	(%)
Smoking Period > 15 Years		
• No	440	87.3
• Yes	64	12.7
Age at starting smoking		
Mean±SD	17.14±3.35	
Range (min-max)	7-33	
Median	17	
Tobacco form		
• Cigarettes	494	98.0
• Pipe	1	0.2
• Shisha/Moa	9	1.8
Shisha and pipe unit/time (no=10)		
• 14 per week	1	10.0
• 20 per week	3	30.0
• 3 per week	1	10.0
• 30 per week	1	10.0
• 5 per day	1	10.0
• 7 per week	3	30.0
Cost of smoking/month (Saudi Riyal)		
• Less than one thousand	499	99.0
• More than one thousand	5	1.0
How soon after waking do you smoke first cigarette?		
• 31 - 60 minute	48	9.5
• 5 - 30 minutes	205	40.7
• Within 5 minutes	251	49.8
How many cigarettes a day do you smoke?		
Categories:		
• 10 or less	35	6.9
• 11 to 20	324	64.3
• 21 to 30	95	18.8
• 31 or more	50	9.9
Mean±SD	22.60±8.79	
Median	20.00	

The study population consists of smokers attending the smoking cessation clinics in the Al-Qassim region between 1st January 2018 until 31st December 2019. The study included all visitors to all smoking cessation clinics between January 1st January 2018 until 31st December 2019.

Data collection methods and tools: Secondary data about visitors to smoking cessation clinics in the Al-Qassim region who were registered and served during the period between 1st January 2018 till 31st December 2019, was obtained from the Smoking Cessation Program – Al-Qassim Health Cluster. The data were provided in a spreadsheet that contains the following sections:

Part one: A 14-questionnaires: including socio-demographic data and the past medical history of smokers: Age, Gender, Occupation, Monthly income, Educational level, Age of starting to smoke, Tobacco form, Number of cigarettes per day, Cost of smoking

Table (3): Fagerstrom Test for Nicotine Dependence (FND) score among study participants

Variable	N	(%)
Do you find it difficult to refrain from smoking in places where it is forbidden?		
• No	265	52.6
• Yes	239	47.4
Which cigarette would you hate to give up?		
• The first in the morning	166	32.9
• Any other	338	67.1
Do you smoke more frequently in the morning?		
• No	283	56.2
• Yes	221	43.8
Do you smoke even if you are sick in bed most of the day?		
• No	282	56.0
• Yes	222	44.0
Fagerstrom score		
Mean±SD	5.4±2.6	
Range (min-max)	1-10	
Median	5	

purchasing per month, Smoking period, Medical history: Cardio-Vascular Diseases (CVD), history of hypercholesteremia, history of respiratory diseases, and Number of clinic visits.

Part two: A parameter list of six items: Fagerstrom score for nicotinic dependence: The Fagerstrom Test for Nicotine Dependence is a widely used tool for determining the severity of physical addiction. The Fagerstrom test assists family physicians in documenting the indications for prescribing nicotine withdrawal medication. The test was created to provide a standard measure of nicotine dependency caused by cigarette smoking. It consists of: Do you find it difficult to refrain from smoking in places where it is forbidden? Which cigarette would you hate to give up? (first in the morning or any other) Do you smoke more frequently in the morning?, and do you smoke even if you are sick in bed most of the day?. In the Fagerstrom score for nicotinic dependence, yes-or-no items are scored from 0 to 1, and multiple-choice items are scored from 0 to 3. The questions are graded on a scale of 0 to 10, with a total score of 0 being the highest.⁶ The higher the total Fagerstrom score, the more severe the patient's physical dependence on nicotine. The total score was divided into four categories: (0 to 2) indicating very low dependence, (3 to 4), low dependence, (5), medium dependence, (6 to 7) high dependence, (8 to 10), and very high dependent. Higher scores indicate that treating withdrawal symptoms,

Table (4) Association between scoring the Fagerstrom test and socio demographic and clinical factors among study participants

Variable	From very low to low*(n=232)		From medium to very high(n=272)		P-value
	N	%	N	%	
Age					
• ≤30 years	141	60.8	146	53.7	0.065
• >30 years	91	39.2	126	46.3	
Occupation					
• Student/retired	82	35.3	77	28.3	0.055
• Working	150	64.7	195	71.7	
Education					
• Illiterate to moderate	4	1.7	4	1.5	0.548
• University and Higher	228	54.4	268	98.3	
Monthly income					
• ≤ 6000 SR	179	77.2	186	68.4	0.018*
• >6000 SR	53	22.8	86	31.6	
Tobacco form					
• Cigarettes	227	97.8	267	98.2	0.523
• Pipe/Shisha/Moa	5	2.2	5	1.8	
Cost per month					
• Less than one thousand	229	98.7	270	99.3	0.426
• More than one thousand	3	1.3	2	0.7	
Number of cigarette per day (Mean±SD)					
	19.5±6.7		25.2±9.5		<0.001*
• ≤20 Cig./day	209	90.1	150	55.1	<0.001*
• >20 Cig./day	23	9.9	122	44.9	
Smoking Period > 15 Years					
• No	205	88.4	235	86.4	0.300
• Yes	27	11.6	37	13.6	
CVS					
• No	222	95.7	255	93.8	0.233
• Yes	10	4.3	17	6.3	
Hypercholesteremia					
• No	223	96.1	258	94.9	0.323
• Yes	9	3.9	14	5.1	
Respiratory diseases					
• No	227	97.8	260	95.6	0.124
• Yes	5	2.2	12	4.4	
Number of visits					
Mean±SD	2.38±2.6		3.78±3.22		<0.001*
Range(min-max)	1-12		1-13		
Median	1		1		
Age at starting of smoking (years) Mean±SD					
	16.9±3.09		17.31±3.55		0.144

*In terms of Fagerström test scores, *P value ≤ 0.05 is considered significant

typically, with nicotine replacement therapy, will be an important part of the patient's treatment plan.⁷

Part three: A two-item question: management; it was divided into groups based on the total Fagerstrom score for nicotinic dependence: Counseling only and counseling plus: Patches of NRT 21 mg (7 patches) -14 mg NRT patch (7 patches) - 7 mg NRT patch (7 patches) 1 mg NRT LOZANGE (96 lozange) -Varencline 0.5+1 mg (25tb) (28tb).

Data management and analysis: Data entry and statistical analyses were performed using SPSS (statistical package for the social sciences), version 23 (SPSS Inc., Chicago, IL, USA). The appropriate

statistical tests were used. A one-sample K-S test first tested the normality of data. Basic descriptive statistics were computed as baseline means, standard deviations (SD), and minimum and maximum range values for continuous variables, while categorical data were summarized as frequency and proportions. The independent t-test was used for the comparative analysis of parametric variables, the In contrast, Mann-Whitney U test (z) was used to compare non-parametric continuous variables in two different groups. Pearson Chi-square tests were applied to the comparative analysis of the categorical variables. Logistic

Table (5): Logistic regression analysis of socio demographic predictors of nicotine dependence among smokers

Predictor	β	Adjusted odds ratio (95%CI)	P value
Monthly income			
• ≤ 6000 SR	Reference category	Reference category	0.077
• >6000 SR	0.402	1.49 (0.95-2.33)	
Number of cigarette per day			
• ≤ 20 Cig./day	Reference category	Reference category	$<0.001^*$
• >20 Cig./day	2.06	7.86 (4.74-13.05)	
Number of visits	0.185	1.20 (1.123-1.289)	$<0.001^*$
Constant		-1.01	
Model χ^2		13.9	
% predicted		70.4	

*P value ≤ 0.05 is considered significant

regression was used, to examine the significantly associated independent risk factors in univariate analysis when collected in a multivariable regression model and their interaction with each other in the determination of nicotine dependence. They were presented in frequency tables and graphs. P-value <0.05 was considered as statistically significant.

RESULTS

Between January 1st, 2018, and December 31st, 2019, 504 smokers visited smoking cessation clinics in the Qassim region, slightly more than one-fifth of whom were aged 26–30 years (22.0%) and 23.0% were 31–40 years with the majority of smokers being males (99.8%). Less than half of them (47.8%) were government employees, 45.6 % had no income, and 25.2% had an income ranging from 6,000 to 10,000 Saudi Riyals (SR). In terms of education, 50.4% had a diploma. Most smokers have no co-morbidities, such as cardiovascular disease (94.6%), hypercholesteremia (95.4%), or respiratory diseases (96.6%), while minority of smokers have co-morbidities (5.4% CVD, 4.6% hypercholesteremia, and 3.4% respiratory diseases, respectively, as shown in Table 1).

Table 2 shows that 87.3% of smokers had smoked for less than 15 years, while 98.0 % of smokers used tobacco cigarettes. In terms of Shisha and pipe units/time (n=10), three participants smoked 20 times per week and three others smoked 7 times per week. Smoking costs less than 1,000 SR per month for 99.0% of participants. Participants who smoked their first cigarette after waking up were 49.8% within five minutes of waking up and 40.7% between five and thirty minutes of waking up. The mean \pm SD of the number of cigarettes per day was 22.60 \pm 8.79, with 64.3% of smokers consuming 11 to 20 cigarettes per day. Approximately 47.4% find it

difficult to quit smoking in places where it is prohibited. It is difficult for 67.1% of study participants to give up the first cigarette in the morning. While 43.8% of participants smoke more frequently in the morning, 44.0% of participants smoke even when they are sick.

The Fagerstrom's score mean \pm SD was 5.4 \pm 2.6, the median was 5, and the range was 1 to 10. (Table 3). The Fagerstrom test of nicotine dependence revealed that most smokers (35.3%) had low dependence, 28.4% had very high dependence, 17.3% had high dependence, 10.7% had very low dependence, and 8.3% had medium dependence. (Figure 1).

Table 4 compares “very low to low nicotine dependence” and “medium to very high nicotine dependence” groups in terms of socio-demographics and co-morbidities among smokers based on Fagerstrom test scores. Nicotine dependence is significantly associated (positively associated) with monthly income (P=0.018), the number of cigarettes per day (p <0.001), and frequent smokers' visits to clinics (p <0.001). In a comparison of the very “low to low nicotine dependent” group and the medium to “very high nicotine dependent” group, the mean starting age of smoking was 16.9 \pm 3.09 & 17.31 \pm 3.55, respectively and the mean number of smoking clinic visits was 2.38 \pm 2.6 & 3.78 \pm 3.22, respectively. While the mean number of cigarettes smoked per day was 19.5 \pm 6.7 & 25.2 \pm 9.5, respectively in the formerly mentioned groups.

Table 5 demonstrates a binary logistic regression analysis regarding nicotine dependence level among study participants, which revealed that smoking more than 20 cigarettes per day and attending smoking clinics more frequently are significant positive predictors of higher nicotine dependence (p < 0.001).

Table (6) Smoking cessation interventions at smoking cessation clinics

Variable	n (n=504)	%
Counseling only*	30	6.0
Counseling plus: NRT** patch 21 mg (7 patches) *	280	55.6
Counseling plus: NRT patch 14 mg (7 patches) *	58	11.5
Counseling plus: NRT patch 7 mg (7 patches)	21	4.2
Counseling plus: NRT LOZANGE 1 mg (96 lozange)*	199	39.5
Counseling plus Varencline 0.5+1 mg (25tb) *	164	32.5
Counseling plus Varencline 1 mg (28tb)*	96	19.0
Number of visits		
Mean±SD	3.13±3.047	
Median (IQR)	1 (2,6)	
range (min-max)	1-13	

* Categories are not mutually exclusive. **NRT: Nicotine Replacement Therapy.

Concerning smoking cessation interventions, 55.6% of smokers received counseling plus NRT patch 21 mg (7 patches), 39.5 percent received counseling plus NRT lozange 1 mg (96 lozange), and 32.5% received counseling plus Varencline 0.5+1 mg (25tb) and 6% received counseling only. The mean ±SD for the number of visits to smoking cessation clinics was 3.13 ±3.047, with a range of 1 to 13 and an interquartile1(2,6) (Table 6).

DISCUSSION

In several studies, most authors have highlighted that pharmacological and psychological therapies provide the highest rate of success in smoking cessation, but there are still many patients who are unable to overcome their tobacco dependence.⁸ Smoking cessation treatment is the cost-effective way to reduce smoking-related morbidity and mortality.⁹

In our study, the most common socio-demographic characteristics of study participants are males, young adults, government employees, and those with no income. Most people in our sample were male (99.8%), which could be explained by the higher prevalence of smoking among men in Saudi Arabia. In Saudi Arabia, the prevalence of smoking in the population was found to be 12.1%, with an obvious gender discrepancy between males (23.7%) and females (1.5%). The prevalence of smoking in Saudi Arabia's population was found to be 12.1%,

with a clear gender gap between men (23.7%) and women (1.5%).¹⁰ Because our clients were mostly men, our findings were very similar to those of the Chinese study (96%). This difference could be due to our female smokers being more reluctant to seek help, being less educated and not seeing smoking as a problem, or some social stigma associated with smoking discouraging them from seeking help. Women in the West attended smoking cessation clinics at a much higher rate than women in Saudi Arabia, China, and Hong Kong (42% of women reported in France, and 32.3% in Spain).¹¹ In Arab countries, the social stigma associated with women smoking is seen as masculine behavior, defeminizing women's traits, and thus shameful and shunned.¹² The findings of studies on gender differences in smoking cessation are controversial. Some studies have found a link between smoking cessation and gender. In some studies, such as the Turkey study (50.4%), in contrast to other studies, which found no relationship or an inverse relationship between gender and smoking cessation, the male gender was associated with a high risk of relapse or non-adherence.¹³

However, in terms of employment, the findings show that less than half of those seeking smoking cessation services (47.8%) are government employees. Environmental pressure may explain this, as employed smokers are subjected to smoke-free workplace policies. Employees are subjected to social pressure from their coworkers. Banning smoking in workplaces are likely to be used and implemented.¹⁴

On the other hand, smokers who do not have a job (e.g., students, retirees, and the unemployed) are willing to quit. According to the findings of this study, about one third participants (30.4%) are students, and 1.2% are retirees; looking for smoking cessation services. Furthermore, 45.6% of those polled had no income Abdullah and Yam (2005) found that being a "student/retired/other" was associated with a higher rate of quitting among Hong Kong Chinese smokers.¹⁵ One explanation for this is as follows: It is unlikely that the employment status of a person would be sensitive enough to detect the impact of household wealth on a person's decision to smoke. The wealth index is a long-term indicator of household economic well-being. Contrarily, employment status reflects a person's current economic situation, which is by nature more ephemeral than household wealth. However, household income and employment status are not

always correlated for retirees or students. Furthermore, by making all products, including tobacco, more expensive, unemployment and the resulting lack of earnings can increase the motivation to quit among unemployed or retired people.¹⁴

In terms of age, more about two thirds of the study participants (63.7%) are between the ages of 21 and 40. The smoking history of students, who are mostly young adults, is shorter. They are therefore more likely to be successful in quitting. Smokers can experience significant immediate health benefits by quitting at any age, but the long-term benefit (such as a longer life expectancy) is greater when they quit when they are young. Thus, the finding that young, unemployed students are more likely to quit is advantageous for the public good.¹⁶

Regarding education, 50.0% had a diploma, 19.4% had completed high school, and 15.7% had a bachelor's degree. In other words, as our study found, patients who attend smoking cessation clinics typically have higher educational levels. This finding could be explained by higher health awareness about the dangers of smoking and the importance of quitting among highly educated people. This finding is consistent with those of an Italian study, which discovered that smokers who attend Italian stop smoking clinics have a high level of education (52.8%).⁸

More than 94% of smokers seeking smoking cessation services do not have any co-morbidities. This could be attributed to the young age of our study participants (63.7%) which ranged between the ages of 21 and 40 years. As a result, from the perspective of public health, this finding is encouraging.

Concerning the smoking profile in the current study, tobacco cigarettes were reported by 98.0% of smokers. Nearly, 71.2% of smokers consumed equal to or less than twenty cigarettes per day. This means that more than two thirds of participants are light smokers (<20 cigarettes per day), and as a result, they are more likely to quit. Heavy smokers (more than 20 cigarettes per day) account for 28.7% of participants. These findings differed from those found in the Italy study, in which 60% of participants were heavy smokers and 40% were light smokers.⁸ Cigarette smoking is the world's most popular method of tobacco consumption. Other tobacco products include water pipe tobacco, other smokeless tobacco products, cigars, cigarillos, roll-your-own tobacco, pipe tobacco, bidis, and

kreteks. Tobacco in all forms is dangerous, and there is no such thing as a safe level of tobacco exposure.¹⁷ To assess smokers' nicotine dependence, we used the Fagerström test. In the present study, 28.4%, 17.3%, and 8.3% of participants were very high dependent, high dependent, and medium dependent, respectively. While 35.3% and 10.7% have low dependence and very low dependence, respectively. These findings were higher than those reported in a Turkish study, which discovered that 3.6%, 13.2%, and 11.5% of participants were extremely dependent, high dependent, and medium dependent, respectively. While 24.1% and 47.6%, respectively, have low and very low dependence.¹⁸ Moreover, a Syrian study revealed that the majority of smokers (29.3%) had low to moderate dependence, 9.7% had high dependence, and 15.9% of students had no dependence, with a mean score of 3.6.¹² The current study found that smokers who smoked more than 20 cigarettes per day had significantly higher levels of nicotine dependence. This result is in line with earlier research that revealed a significant correlation between nicotine dependence, self-reported daily cigarette consumption, and the success of quitting smoking.¹⁹ In Saudi Arabia, smoking cessation clinics offer a combined cognitive-behavioral and pharmacological treatment, which is considered the best option for quitting smoking.²⁰ The physician determined the specific course of treatment for each smoker in the current study and whether to administer pharmacotherapy based on the smoker's dependence on nicotine and the existence of medical conditions that would make drug therapy contraindicated.

In the current study, we found that 94% of the smokers received pharmacotherapy. Counseling plus nicotine replacement therapy (NRT) patches 21 mg (7 patches) (55.6%), counseling plus NRT lozenges 1 mg (96 lozenges) (39.5%), and counseling plus Varenline 0.5 mg + 1 mg (25 tb) (32.5%) were shown in descending order. According to our findings, NRT patch is the most extensively used over-the-counter medication for smoking cessation. According to reports, NRT is a cost-effective tactic linked to successful treatment.¹³ More than 100 double blind, randomized, placebo controlled trials evaluating NRT in the form of nicotine gum, transdermal patch, or other products have been conducted, and a meta-analysis of these trials found that NRT had an average effect of 7 percentage points on the ability to remain abstinent

for at least 6 months following a quit attempt.²¹ Varenicline is a partial agonist of the nicotine receptor that causes the release of dopamine, alleviating nicotine withdrawal symptoms and cravings.²²

Limitation of the study

One of the study's limitations was that it was conducted in a single region of Saudi Arabia, which might have prevented our results from being broadly representative. Second, self-reported and retrospective data are used to determine respondents' tobacco use and nicotine dependence. Recall bias, social desirability bias, and other measurement errors frequently have an impact on these data. Furthermore, the impact of the factors on smoking cessation program adherence should be addressed in future research. Understanding these factors may lead to more effective adherence interventions and improve the success of smoking cessation attempts.

Recommendations: This study suggests that public smoking cessation programs needs to be designed to specifically target male, young adults, students, governmental employees and lower income, and that alternative treatment approaches should be offered to increase the participation of female smokers and vulnerable groups. To enhance the efficacy of interventions and implement the best strategy, epidemiologic determinants should be researched. Smoking treatment programs should put in consideration the epidemiological factors in the future to increase their efficacy and use the best strategy possible.

CONCLUSIONS

The present study, focused on detailed descriptive data on smokers' profiles at smoking cessation clinics as well as factors associated with nicotine dependence in Al-Qassim, Saudi Arabia. The most common socio-demographic characteristics of study participants are males, young adults, government employees, and those with no income. A high level of nicotine addiction has been detected. Nicotine dependence was significantly higher in smokers with a higher monthly income, those who smoked more than 20 cigarettes per day, and those who visited a smoking cessation clinic more frequently.

Ethical approval

Institutional review board (IRB) approval was obtained from Ethical Committee of the General

directorate of health in Al-Qassim region (IRB NO. 1442-686792), MOH. The study was based on retrospective records, no informed consent was obtained because, when patients enroll in the clinic, they are informed that their data will be used for research. To assure anonymity, participants' names were not collected, and merely a patient's file number and ID were recorded. To maintain confidentiality, all data were collected directly in SPSS in the laptop with a personal password. All information obtained from reporting forms through the data collection sheet was used solely for research purposes.

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Conflict of Interest

All authors have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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List of abbreviations: NRT, Nicotine replacement therapy; CVD, Cardio-vascular diseases; IRB, Institutional review board; MOH, Ministry Of Health; SD, Standard Deviations.

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