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Changes in Smoking Behavior in the COVID-19 Pandemic: A Single Center Study in Family Practice

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ABSTRACT

Objective: There are controversial studies on smoking addiction in the COVID-19 pandemic. While some studies show increased tobacco use during the pandemic, others report increased smoking cessation attempts. This study examined changes in tobacco use and quit intentions during the COVID-19 pandemic compared to pre-pandemic.

Methods: A cross-sectional study was designed and three groups were formed by including patients over 18 years of age, who were smokers, and who presented to the Education Family Health Center and had RT-PCR test results for COVID-19. Among these patients, patients with COVID-19 symptoms and complaints and positive RT-PCR test results constituted the COVID-19 positive group, patients who were COVID-19 negative but isolated due to their contacts constituted the contact group, and healthy people without any COVID-19 contact and symptoms constituted the healthy group. Demographic characteristics, smoking status before the COVID-19 pandemic, change in smoking status after COVID-19 test result or contact, and Fagerström nicotine dependence test results were compared.

Results: Of the total 131 participants enrolled in the study, 70 were in the healthy group, 31 were in the COVID-19 negative group, and 30 were in the COVID-19 positive group. Men were predominant in three groups (60%, 83.9%, and 73.3% in normal, COVID-19-neg, and COVID-19-positive groups, respectively) with a small significant difference (p=0.048). The mean ages were 41.09±12.85, 38.21±11.69, and 39.47±11.66 years in the healthy, COVID-19 negative, and COVID-19 positive groups, respectively, with no significant difference (p>0.05). Fagerström dependence scores were 1.82±1.05, 1.53±0.86, and 1.40±0.72 in the healthy, COVID-19 negative, and COVID-19 positive groups, respectively, and were not statistically different (p>0.05). Smoking prevalence decreased by 1.13 (±4.17) cigarettes per day in the healthy group, by 3.97 (±5.31) cigarettes in the COVID negative group, and by 10.14 (±7.86) cigarettes in the COVID positive group, with a statistically significant decrease in smoking prevalence in all three groups (p<0.01). Those in the COVID-19 positive group were statistically significantly more likely to want to stop smoking.

Conclusion: Our study found that people significantly reduced smoking and considered quitting during the COVID-19 pandemic. Every individual who quits smoking is an asset to society. To achieve this goal, it should be aimed at raising awareness and providing counseling to quit smoking by studying smoking and nicotine dependence in all situations.

Keywords: COVID-19, Family practice, Nicotine dependence, Smoking

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Introduction

Smoking is known to negatively affect the immune system and reduce the defense against infectious diseases. The negative effects of smoking on the respiratory tract and lungs have been shown to have a negative impact on the prognosis of COVID-19. In most studies on the mortality of COVID-19, smoking has been shown to increase the mortality and complications of the disease (Berlin et al., 2020; Eisenberg & Eisenberg, 2020; Farsalinos et al., 2020; Roengrudee Patanavanich & Stanton A Glantz, 2020). Among patients with COVID-19, it is known that smokers and former smokers need intensive care and mechanical ventilation more than non-smokers. In addition, severe COVID-19 symptoms were 1.4 times more common in former smokers and current smokers compared to non-smokers (Freire et al., 2022).

Adverse effects of smoking on COVID-19 infection have inevitably affected people's smoking behavior. However, the effects of the COVID-19 pandemic on smoking addiction are controversial. While tobacco use has increased in some countries since the beginning of the pandemic, tobacco cessation attempts and the success of these attempts have also increased (Veldhuizen et al., 2021).

Changes in smoking behavior and quit attempts appear to be related to the socially restrictive measures taken to prevent the spread of the disease. The strict social isolation measures taken to prevent the spread of COVID-19 have led to the emergence of severe negative psychological symptoms. Smoking also appears to have increased to relieve these psychological symptoms (García-Álvarez et al., 2020; Ornell et al., 2020).

In the COVID-19 pandemic, restricted social life, job losses, remote working (Veldhuizen et al., 2021), the claim that smoking may be protective against the virus in COVID-19 (Changeux et al., 2020; Paleiron et al., 2021; van Zyl-Smit et al., 2020) and coronaphobia (Ozcelik & Yilmaz Kara, 2021) seem to have caused a change in tobacco use behavior and quitting behavior (Ozamiz-Etxebarria et al., 2020; Ozcelik & Yilmaz Kara, 2021; van Zyl-Smit et al., 2020; Veldhuizen et al., 2021). Differences in health service delivery also seem to be effective on this change. With the restrictive measures taken to reduce transmission, health service delivery has also started to be provided virtually. Health services provided virtually seem to be effective on tobacco cessation behavior and patients in tobacco cessation programs (Veldhuizen et al., 2021).

The emotional aspect of the issue cannot be ignored. At this point, studies showing that there is an increase in the number of former smokers who start smoking again after national disasters and an increase in the number of current smokers support this emotional burden (Lanctot et al., 2008; Osaki et al., 2020; Parslow & Jorm, 2006; Vlahov et al., 2002). Interest in smoking cessation has also increased following these national disasters, along with increased use (Lanctot et al., 2008).

As can be seen, it has not been clearly determined how smoking will be affected in the pandemic. Studies seem to have focused more on the effects of the association of smoking and COVID-19 infection on complications and mortality. And this negative association seems clear at this point. This negative association between smoking and COVID-19 creates an expectation that there will be an increase in smoking cessation attempts and success and that current smokers will reduce their smoking. However, due to the multifaceted emotional stress caused by the pandemic, there is an increase in smoking in most countries during this period (Carreras et al., 2022).

At this point, it is seen that the COVID-19 pandemic has caused positive effects on some smokers and negative effects on others (Matsungo & Chopera, 2020; Pettigrew et al., 2020). More studies are needed to analyze nicotine dependence and smoking behavior in the COVID-19 pandemic. In this study, we will investigate the change in tobacco use behavior during the pandemic in a group of patients with COVID-19, a contact group and a group of healthy patients without any contact.

Smoking cessation is primarily a matter of intention. Therefore, participants should be asked about their smoking status and intentions. The risk of complications and mortality associated with smoking and COVID-19 infection is well known. Given this information, it is expected that smoking will be reduced and cessation will increase during the pandemic period.

The aim of this study was to investigate whether there is a change in the smoking behavior of individuals during the pandemic period. In addition, to determine the smoking and nicotine dependence status of COVID-19 positive, contacted or healthy individuals were compared to see if there was a change during the COVID-19 pandemic period.

Methods

Study Design

Our study is a cross-sectional, single-center study.

Ethical Approval

Prior to the study, study permission was obtained from the Ministry of Health with the application number 2021-09-13T10_07_01. Afterwards, ethical approval was obtained from Atatürk University Faculty of Medicine Clinical Research Ethics Committee (approval date: 30.09.2021/06).

Setting and Study Period

Our study was conducted in the Family Medicine Unit of Campus Education Family Health Center, which operates under Atatürk University Family Medicine Department, between October and December 2021.

Participants

In our study, simple random sampling was used, which was conducted on patients who presented to the Education Family Health Center with COVID-19 symptoms and complaints during the study period. Among these patients, patients over the age of 18 who were smokers, patients who were referred due to suspicion of COVID-19 and whose RT-PCR test result was positive, healthy people who were in isolation due to COVID-19 contact and who did not have any COVID-19 contact and symptoms were included in our study. Patients who were under 18 years of age and had not smoked before, pregnant, puerperant, emergency patients, patients with poor level of consciousness and patients who did not volunteer to participate in the study were not included in our study.

Patients who met the study criteria formed three groups. Among these patients, patients with COVID-19 symptoms and complaints and positive RT-PCR test results constituted the COVID-19 positive group, patients who were COVID-19 negative but were in isolation due to their contacts constituted the contact group, and healthy people without any COVID-19 contact and symptoms constituted the healthy group.

Instrument

In order to avoid contact with the patients included in our study and to prevent COVID-19 transmission and spread, they were asked to answer the study survey questions online or by phone. The demographic characteristics, smoking status, smoking status of the patients included in our study by fulfilling the inclusion criteria, smoking status before COVID-19 positive result or contact, and the change according to the COVID test result or after contact were evaluated with the Fagerström smoking dependence test.

The Fagerström test of smoking dependence is the most widely used tool for diagnosing smokers who want to quit and for assessing smoking dependence. It has been shown to predict smoking cessation outcomes (Svicher et al., 2018). The Turkish translation and validation study was conducted by Uysal et al. with a Cronbach alpha value of 0.56 (Uysal et al., 2004). The test can be self-administered or administered by an interviewer. It has six questions with different scores, and participants will score from 0 to 10, with higher scores indicating higher addiction, 0-3 scores indicating minimal addiction, 4-6 scores indicating moderate addiction, and 7-10 scores indicating high addiction (Heatherton et al., 1991).

Statistical Analysis

The data obtained and the differences between the groups were statistically investigated with the SPSS 23.0 program. Categorical data were presented as frequency and percentage, numerical data were presented as mean and standard deviation. Chi-square test was used in the statistical analysis of categorical data. Shapiro-Wilk test was used to determine the normal distribution of the data. One way ANOVA test was used in groups with normal distribution and Kruskal Wallis test was used in the analysis of independent groups in groups without normal distribution. Tukey test was used in post-hoc analysis and Spearman correlation test was used in correlation analysis. Statistical significance was taken as $p<0.05$.

Results

A total of 131 participants out of 167 patients were included in the study; the number of participants in the healthy group was 70, the number of participants in the COVID-19 negative but contacted group was 31, and the number of COVID-19 positive participants was 30. The proportion of male participants was 60% (n=42) in the healthy group, 83.9% (n=26) in the COVID-19 negative group, and 73.3% (n=22) in the COVID-19 positive group, with a borderline significant difference between the groups (p=0.048) (Table 1). The mean age was 41.09 ± 12.85 years in the healthy group, 38.21 ± 11.69 years in the COVID-19 negative group, and 39.47 ± 11.66 years in the COVID-19

positive group, and there was no significant difference between the groups (p=0.360). The proportion of participants with chronic diseases was 56.4%, 72.0%, and 72.0% in the healthy group, COVID-19 negative group, and COVID-19 positive group, respectively, and there was no statistical difference between them (p=0.250). Fagerström dependence scores were 1.82 ± 1.05; 1.53 ± 0.86; and 1.40 ± 0.72 in the healthy group, COVID-19 negative group, and COVID-19 positive group, respectively, with no statistical difference (p=0.175) (Table 2).

Table 1. Comparisons of Sex Distribution and Chronic Disease Existence in Study Groups

		Healthy		**COVID-19 Negative**		**COVID-19 Positive**		**Chi-square**	**P**
		Count	Column %	Count	Column %	Count	Column %		
Sex	Male	42	60.0%	26	83.9%	22	73.3%	6.082	**0.048**
	Female	28	40.0%	5	16.1%	8	26.7%		
Chronic Disease	No	31	56.4%	18	72.0%	18	72.0%	2.773	0.250
	Yes	24	43.6%	7	28.0%	7	28.0%		

(Note: Bold *P* value indicates statistical significance.)

The daily cigarette use of the participants before and after the pandemic is presented in Table 3 and it was found that the average cigarette use rates decreased in all three groups. Statistically, it was determined that there was a significant decrease in smoking rates in all three groups compared to before the pandemic (p<0.01). When the smoking status of the participants before and during the COVID-19 pandemic was questioned, it was found that there was a decrease in cigarette consumption of 1.13 ± 4.17 in the healthy group, 3.97 ± 5.31 in the COVID-19 negative group, and 10.14 ± 7.86 in the COVID-19 positive group, which was statistically significant (p<0.001) (Table 4).

When the participants were questioned about their desire to quit smoking, there was a statistical difference between the groups (p=0.045), but in post-hoc analysis, those in the COVID-19 positive group were more likely to consider quitting smoking. According to gender, although males and those without chronic diseases were more likely to consider quitting smoking, there was no statistical difference (p>0.05) (Table 5).

The Fagerström dependence score was 1.58 ± 0.87 and 1.75 ± 1.05 in those who considered quitting smoking and those who did not, respectively, but there was no statistical difference between them (p=0.330).

Table 2. Comparison of Age Distribution and Fagerstrom Nicotine Dependence Test Scores Among Study Groups

		Age	Chi-square	P	Fagerstrom	Chi-square	P
Healthy	Mean	41.09	0.838	0.360	1.82	1.837	0.175
	Std. Deviation	12.85			1.05		
	Median	42.50			1.50		
	Minimum	19.00			1.00		
	Maximum	68.00			5.00		
COVID-19 Negative	Mean	38.21			1.53		
	Std. Deviation	11.69			0.86		
	Median	36.00			1.00		
	Minimum	19.00			1.00		
	Maximum	59.00			4.00		
COVID-19 Positive	Mean	39.47			1.40		
	Std. Deviation	11.66			0.72		
	Median	39.50			1.00		
	Minimum	18.00			1.00		
	Maximum	59.00			4.00		

The correlation according to the age, Fagerström score, number of cigarettes use before and during the pandemic of the participants in the groups is presented in Table 6. Accordingly, the amount of smoking before the pandemic and smoking during the pandemic were positively correlated in all groups. In the healthy group, there was a weak positive correlation between age and smoking before and during the pandemic. In both the healthy group and the COVID-19 negative group, there was a strong positive correlation between the Fagerström score and the amount of smoking before and during the pandemic. In the COVID-19 positive group, there was a positive correlation between Fagerström score and smoking only before the pandemic.

Table 3. Comparison Between Study Groups of Participants' Previous and Current Amount of Smoking Per Day

		Previous Smoking (Count/Day)	Recent Smoking (Count/Day)	Z	P
Healthy	Mean	13.34	12.21	-2.668	**0.008**
	Std. Deviation	9.12	8.51		
	Median	10.00	10.00		
	Minimum	1.00	1.00		
	Maximum	40.00	40.00		
COVID-19 Negative	Mean	14.20	10.23	-3.523	**<0.001**
	Std. Deviation	9.06	8.98		
	Median	15.00	7.00		
	Minimum	2.00	0.00		
	Maximum	40.00	40.00		
COVID-19 Positive	Mean	13.54	3.39	-4.377	**<0.001**
	Std. Deviation	8.80	3.20		
	Median	10.00	3.00		
	Minimum	1.00	0.00		
	Maximum	30.00	10.00		
Chi-square		0.230	2.149		
P		0.631	0.143		

(**Note**: Bold *P* values indicate statistical significance.

Table 4. Daily Change in Past and Current Smoking of the Study Group

		Daily Smoking Amount Change	Chi-square	P
Healthy	Mean	1.13	52.389	**<0.001**
	Std. Deviation	4.17		
	Median	0.00		
	Minimum	0.00		
	Maximum	30.00		
COVID-19 Negative	Mean	3.97		
	Std. Deviation	5.31		
	Median	1.50		
	Minimum	0.00		
	Maximum	18.00		
COVID-19 Positive	Mean	10.14		
	Std. Deviation	7.86		
	Median	7.50		
	Minimum	0.00		
	Maximum	27.00		

(Note: Bold *P* value indicates statistical significance.)

Table 5. Comparison of Study Groups in Terms of Participants with and without Smoking Cessation Plans

		Planning to Quit Smoking		Not Planning to Quit Smoking		Chi-square	P
		Count	Row %	Count	Row %		
COVID- 19 Groups	Healthy	34_a	49.28%	35_a	50.72%	6.207	**0.045**
	COVID-19 Negative	15_a	48.39%	16_a	51.61%		
	COVID-19 Positive	7_a	23.33%	23_b	76.67%		
Age	1	34	38.20%	55	61.80%	2.735	0.098
	2	22	53.66%	19	46.34%		
Chronic Disease	No	26	38.81%	41	61.19%	1.241	0.265
	Yes	19	50.00%	19	50.00%		

(**Note:** Similar lowercase letters indicate statistical equality, while different lowercase letters indicate statistical difference. Bold P value indicates statistical significance.)

Table 6. Spearman's Correlation Test Results of Study Groups

			Age	Fagerstrom	Previous Smoking	Current Smoking
Healthy Group	Age	r	1.000	0.226	0.258*	0.283*
		p		0.063	0.034	0.019
	Fagerstrom	r		1.000	0.753**	0.707**
		p			0.000	0.000
	Previous Smoking	r			1.000	0.945**
		p				0.000
	Current Smoking	r				1.000
		p				
COVID-19 Negative Group	Age	r	1.000	0.275	0.318	0.232
		p		0.156	0.099	0.235
	Fagerstrom	r		1.000	0.751**	0.721**
		p			0.000	0.000
	Previous Smoking	r			1.000	0.759**
		p				0.000
	Current Smoking	r				1.000
		p				
COVID-19 Positive	Age	r	1.000	0.371*	0.198	-0.077
		p		0.043	0.311	0.698
	Fagerstrom	r		1.000	0.640**	0.214
		p			0.000	0.274
	Previous Smoking	r			1.000	0.474*
		p				0.011
	Current Smoking	r				1.000
		p				

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Discussion

Within the scope of our study, demographic characteristics, amount of cigarette use and smoking cessation thoughts were compared between the groups whose RT-PCR test results were negative or positive due to the fact that the individuals who smoked during the COVID-19 pandemic were healthy or had symptoms and were contacts. According to the data we obtained, there was a statistically significant decrease in the amount of cigarette use in all three groups compared to before the pandemic, but the highest decrease in the amount of cigarette consumption was found in COVID-19 positive patients. The thought of quitting smoking was again found to be significantly different in the COVID-19 positive group. However, there was no significant difference between the groups in terms of gender, presence of chronic disease or Fagerström dependence test score.

Since COVID-19 patients present with pulmonary symptoms and clinic such as shortness of breath, cough,

pneumonia and smoking among the patient groups at risk for COVID-19 (Reddy et al., 2021), it can be thought that there is an awareness in the society for smoking cessation and thus smoking rates have decreased. On the other hand, it is also possible that smoking may have increased due to fear of COVID-19, uncertainties about the future and psychological stress caused by COVID-19 in other studies in the literature (Rahman et al., 2020). However, what may cause the greatest confusion is the existence of studies showing that smoking is protective against COVID-19 (Tsigaris & Teixeira da Silva, 2020). Therefore, there is a need to investigate the smoking behaviors and addiction levels of individuals in the COVID-19 pandemic in order to develop smoking-related counseling and health policy. In this study, no significant difference was found between the Fagerström dependence test score and the intention to quit smoking. In this context, smoking counseling should be offered by all physicians to all groups of smokers, regardless of their addiction level.

The harmful effects of smoking on health and its association with lung diseases are well known (O'Keeffe et al., 2018; Strzelak et al., 2018). In the current COVID-19 pandemic, as smoking worsens symptoms and prognosis (R. Patanavanich & S. A. Glantz, 2020), more practices and counseling to encourage smoking cessation are needed. As found in our study, the population decreased their smoking rates and are tender to quit smoking, this tendency should be empowered and consultations should be applied.

Limitations

Our study has several limitations. First, the sample size is small and the study was conducted in a single center, which limits the generalizability of the study results. Multicenter studies with larger sample sizes are needed. Second, nicotine dependence and smoking cessation intentions were self-reported by participants and therefore may not be an accurate reflection of the truth. Third, the study was conducted in the middle of the pandemic, when everyone was still under the effects of COVID-19, which may have influenced the participants' decisions. Longer cohort studies are needed to see smoking cessation success rates.

Conclusion and Recommendation

It has been determined that smoking rates have decreased during the COVID-19 pandemic. Every individual who quits smoking with efforts to quit smoking will be an asset to society. In the COVID-19 pandemic, it should be an important goal for every physician to turn the decrease in smoking rates into an opportunity and to ensure smoking cessation by encouraging and strengthening smoking cessation counseling. With this goal, it should be planned to raise awareness, develop new strategies and new projects by investigating smoking and nicotine addiction levels.

Ethics Committee Approval: Ethical approval obtained from Atatürk University Faculty of Medicine Clinical Research Ethics Committee.
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Author Contributions: MD and MB conceived and designed the study. MD conducted the survey and collected the data. KK performed the statistical analyses. HAA drafted and wrote the paper. KK, MD, HAA, and MB discussed the results. MB supervised the study, interpreted the data, and finalized the paper.
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