The association between COVID-19 anxiety levels and tobacco use among patients within a smoking cessation polyclinic

Sibel Baktır Altuntaş1, Hilal Özkaya1, Ahmet Beşel1, Sümeyra Betül Namli2, Kübra Albayrak2

ABSTRACT

INTRODUCTION The aim of this study was to investigate the impact of the COVID-19 pandemic on the anxiety level of smokers and the relationship between smoking behavior and COVID-19 anxiety level.

METHODS Our study was planned as a descriptive cross-sectional survey. A 32-question face-to-face questionnaire containing the Coronavirus Anxiety Scale (CAS) and the Fagerström test for nicotine dependence (FTND) was administered to 349 patients who had applied to the smoking cessation polyclinic between 15 May 2021 and 1 August 2021. SPSS 25.00 was used for statistical analysis.

RESULTS A total of 349 individuals participated in the study. The mean CAS and FTND total scores were 0.89±2.13 (range: 0–20) and 6.34±2.53 (range: 0–10), respectively. There was a statistically significant difference between CAS total score and gender (p=0.005), marital status (p=0.006), changes in the amount of smoking during the pandemic (p=0.011), and impact of the COVID-19 pandemic on smoking cessation (p<0.001). The impact of the COVID-19 pandemic on smoking cessation was statistically significantly different between knowing that the rate of intensive care unit (ICU) admissions due to COVID-19 infection is higher in smokers, smokers are heavily infected with COVID-19 and the mortality rate due to COVID-19 infection is higher in smokers (p<0.001).

CONCLUSIONS Anxiety due to the COVID-19 pandemic may cause a change in the amount of smoking and the decision to quit smoking. Healthcare professionals should transform COVID-19 anxiety into an opportunity to improve health and quit smoking, one of the healthy behaviors.

INTRODUCTION Smoking, which is designated as the most important preventable health problem by the World Health Organization (WHO), has been defined as a disorder in the ICD-11 table1. Smoking cessation polyclinics occupy a key position in the treatment of addiction to tobacco products, especially cigarettes, and in the provision of counselling services2. The importance of treating smoking addiction was reemphasized with the declaration of the COVID-19 epidemic as a pandemic on 11 March 20203.

Additional risk factors in the course of COVID-19 infection, which can range from mild (fever, dry cough, myalgia) to severe (pneumonia) and life-threatening (respiratory failure, sepsis syndrome, multiple organ failure), are the forerunners of the severity of the disease4. Among the risk factors for COVID-19 associated pneumonia, the role of smoking is controversial. It has been previously suggested

Published by European Publishing. © 2022 Baktır Altuntaş S. et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License. (https://creativecommons.org/licenses/by/4.0/)
that high ACE-2 expression in smokers predisposes them to increased SARS-CoV-2 infection. There are analyses confirming that the severity of COVID-19 disease is two times higher in smokers than never smokers. Current evidence suggests that smoking is associated with increased disease severity and mortality in hospitalized COVID-19 patients.

To reduce the risk of transmission in COVID-19 infections, which have a high mortality rate, many countries have adopted stringent measures such as physical distancing measures, restrictions on international travel, closure of schools, and postponement of meetings and demonstrations. Despite the implementation of these non-pharmaceutical measures taken, rising infection and death rates and uncertainty about the future may induce high levels of emotional distress and avoidance behaviors in people who are very worried about contracting COVID-19.

Somatic symptoms such as insomnia, loss of appetite, and dyspeptic symptoms often occur in conjunction with anxiety in response to extreme fear or worry. Anxiety due to COVID-19 is common, and the Coronavirus Anxiety Scale (CAS) was developed by Lee et al. to measure anxiety. The scale assesses symptoms of anxiety and dysfunctional thinking according to DSM-5 criteria. The Turkish validity study of the questionnaire was conducted by Ladikli et al. It is a brief mental health screening to identify possible dysfunctional anxiety related to the COVID-19 crisis. Each item of the CAS measures the response to a different physiologically based fear or anxiety related to thoughts or information about coronavirus. The CAS examines five different somatically based fear and anxiety symptoms, including dizziness, tonic immobility, sleep disturbance, loss of appetite, nausea, or abdominal discomfort triggered by thoughts and information about the coronavirus. While there are studies showing that fear and anxiety triggered by the pandemic increases adherence to protective measures (hygiene rules, mask, and social distance) to protect against infection, there are also studies showing that they contribute to the development of unhealthy behaviors such as increased alcohol consumption and decreased physical activity. The impact of the pandemic on smoking behavior, which is one of the addictive substances, varies.

This study aims to examine the impact of the COVID-19 pandemic on smokers’ anxiety levels and the relationship between smoking behavior and COVID-19 anxiety levels.

**METHODS**

**Study population and sample**

Our study was as a descriptive cross-sectional study and was conducted in the Smoking Cessation Polyclinic, between 31 May 2021 and 1 August 2021. Since the mean number of patients presenting to the smoking cessation polyclinic within one month between March and April was 160, the sample size was calculated to be 220 with a 95% confidence interval (n=220). Patients who applied to the outpatient clinic on the dates of the study were briefed about the study. Questionnaires were administered to those who met the inclusion criteria.

**Inclusion criteria**

The inclusion criteria were: patients presenting to the smoking cessation polyclinic for the first time; the date of first application of patients who had previously presented to the smoking cessation polyclinic should not be before May 31; no history of using psychiatric drugs (within the last 6 months); no psychiatric illness should have been diagnosed; no memory problems and no memory-related neurological disease (Alzheimer’s disease, vascular dementia, Lewy body dementia and frontotemporal dementia, mixed dementia); the ability to speak, understand and read Turkish; not to be pregnant; and be aged >18 years.

**Data collection tools**

The questionnaire form used in the study was prepared by the researchers. A total of 22 questions were asked. Questions reported on the sociodemographic characteristics of the participants and the frequency of use of tobacco and tobacco products, their smoking behavior during the COVID-19 pandemic, the time to decide to quit smoking, the impact of COVID-19 pandemic on smoking cessation, the status of having a COVID-19 infection, the presence of individuals who had COVID-19 in their immediate surroundings, and information questions about the COVID-19 infection progress in smokers. Survey questions also included the questions of the Coronavirus Anxiety Scale (CAS) and the Fagerström test for nicotine dependence (FTND). The CAS is used to determine the frequency
of anxiety symptoms experienced by individuals, consisting of 5 questions whose Turkish validity for measuring anxiety levels was performed\(^{10,12}\). Each item of the CAS was scored on a 5-point Likert scale ranging from 0 (never) to 4 (almost every day) based on experience in the past two weeks. The minimum score for each question was 0, and the maximum score was 4. The total score ranged from 0–20, and higher scores meant that the coronavirus-related anxiety was greater.

The Fagerström test for nicotine dependence (FTND) is the most common test designed to assess tobacco dependence. The reliability and validity study of FTND was conducted in Turkey and found to be applicable in Smoking Cessation Clinics\(^{15}\). FTND has a graded scale (0–10) corresponding to the degree of nicotine dependence. Those who scored 0–2 points are considered to have a nicotine dependence that is ‘very mild’, 3–4 points ‘mild’, 5 points ‘moderate’, 6–7 points ‘severe’, and 8–10 points ‘extremely severe’.

Ethical considerations
Approval was obtained from the Ethics Committee of Başkıkşır Çam and Sakura City Hospital for this study and was conducted in accordance with the principles of the Declaration of Helsinki. Participation in the study was on a voluntary basis, and informed consent was obtained from each participant. Confidentiality and anonymity of the respondents were also ensured.

Statistical analysis
All statistical analyses were performed using IBM SPSS version 25.0 (SPSS Inc., Chicago, Illinois USA). Continuous variables are presented as mean±SD, and some of the categorical variables are given as frequency (n) and percentage (%). In addition, Cronbach’s alpha internal consistency coefficients were calculated by employing the results of participants’ minimum, maximum, and mean scores on the scales. Parametric tests were used in the study because the number of participants exceeded 200\(^{16}\). Pearson correlation analysis was performed to determine the relationship between the total scores of the scales. Independent samples t-test and one-way ANOVA, which are parametric tests, were applied to determine if there was a significant difference between the independent variables and the total scores of the scales. In case of significant difference between the groups, the post hoc test was conducted to determine between which groups the significance was. The Sidak post hoc test was selected due to homogeneous variance distribution and unequal number of samples\(^{17}\). The chi-squared test was used to compare categorical variables. Multivariate linear regression analysis was performed to determine the variables predicting CAS total score. A p<0.05 was considered statistically significant.

RESULTS
Sociodemographic characteristics of the respondents
A total of 349 subjects participated in the study. The mean age of the participants was 36.8±10.7; 35.5% (n=124) were female. While the proportion of those whose tobacco use increased during the pandemic COVID-19 was 26.1% (n=91), 10% (n=35) decreased their tobacco use. The sociodemographic data are shown in Table 1.

Table 1. Sociodemographic characteristics of the participants (N=349)

| Characteristics            | n or Mean (range) | % or Mean±SD |
|----------------------------|-------------------|--------------|
| Gender                     |                   |              |
| Female                     | 124               | 35.5         |
| Male                       | 225               | 64.5         |
| Age (years)                |                   |              |
| ≤20                        | 11                | 3.2          |
| 21–30                      | 106               | 30.4         |
| 31–40                      | 108               | 30.9         |
| 41–50                      | 92                | 26.4         |
| >50                        | 32                | 9.2          |
| Education level            |                   |              |
| Primary school or literate | 88                | 25.2         |
| Middle/high school         | 166               | 47.6         |
| Undergraduate degree       | 84                | 24.1         |
| Postgraduate degree        | 11                | 3.2          |
| Profession                 |                   |              |
| Officer                    | 41                | 11.7         |
| Employee                   | 139               | 39.8         |
| Self-employed              | 82                | 23.5         |
| Retired                    | 17                | 4.9          |
| Housewife                  | 61                | 17.5         |
| Other                      | 9                 | 2.6          |

Continued
Comparison of the CAS and FTND for the different variables

The internal consistency coefficients of Cronbach’s alpha for the scales used in the questionnaire ranged from 0.66–0.80. Since these values were between or above the recommended limits of 0.50–0.70 in the literature, the internal consistency of the scales in this study was adequate$^{18-20}$. 

Table 1. Continued

| Characteristics                                      | n or Mean (range) | % or Mean±SD |
|------------------------------------------------------|-------------------|--------------|
| Marital status                                       |                   |              |
| Married                                              | 240               | 68.8         |
| Single                                               | 90                | 25.8         |
| Widowed/divorced                                     | 19                | 5.4          |
| Chronic disease                                      |                   |              |
| Present                                              | 83                | 23.8         |
| Absent                                               | 266               | 76.2         |
| Regular use of medication                            |                   |              |
| Present                                              | 103               | 29.5         |
| Absent                                               | 246               | 70.5         |
| Are there any COVID-19 positive people around you?   |                   |              |
| Yes                                                  | 161               | 46.1         |
| No                                                   | 165               | 47.3         |
| I’m not sure                                         | 23                | 6.6          |
| If there is a COVID-19 positive person around you, where? |       |              |
| At home in my family                                 | 78                | 48.4         |
| At the workplace                                     | 42                | 26.1         |
| Other                                                | 41                | 25.5         |
| Have you had a COVID-19 infection?                   |                   |              |
| Yes                                                  | 35                | 10.0         |
| No                                                   | 295               | 84.5         |
| I’m not sure                                         | 19                | 5.4          |
| Were you hospitalized when you contracted the COVID-19 infection? |       |              |
| Yes                                                  | 1                 | 2.9          |
| No, I was treated at home                            | 34                | 97.1         |
| Which tobacco and tobacco products do you use? * (n=370) |       |              |
| Cigarette                                            | 347               | 93.8         |
| Hookah                                               | 16                | 4.3          |
| Electronic cigarette                                 | 7                 | 1.9          |
| How long have you been smoking? (years)              | 17.0 (1.0–65.0)   | 18.26±10.31  |
| 0–10                                                 | 110               | 31.5         |
| 11–20                                                | 123               | 35.2         |
| 21–30                                                | 75                | 21.5         |
| >30                                                  | 41                | 11.7         |
| The amount of smoking during the pandemic            |                   |              |
| Increased                                            | 91                | 26.1         |

*The number n exceeds the sample size because there were multiple responses. FTND: Fagerström test for nicotine dependence.
| Variables                              | Categories                          | n    | FTND total score | t/F  | p     | CAS total score | t/F   | p     |
|---------------------------------------|-------------------------------------|------|------------------|------|-------|-----------------|-------|-------|
|                                       |                                     | Mean±SD | p=0.057 | Mean±SD | p=0.057 | Mean±SD | p=0.057 | Mean±SD | p=0.057 |
| Gender                                | Male                                | 124  | 6.52±2.54       | 0.927| 0.354| 1.40±2.79       | 2.868 | 0.005|
|                                       | Female                              | 225  | 6.25±2.53       | 0.611| 1.626| 0.61±1.79       | 0.799 | 0.124|
| Age (years)                           | ≤20                                  | 11   | 7.18±2.40       | 2.586| 0.037| 1.64±2.91       | 1.498 | 0.202|
|                                       | 21–30                                | 106  | 6.80±2.33       | 0.799| 1.796| 0.79±1.79       | 0.799 | 0.124|
|                                       | 31–40                                | 108  | 6.38±2.58       | 1.219| 2.666| 1.21±2.66       | 1.219 | 2.666|
|                                       | 41–50                                | 92   | 5.98±2.69       | 0.666| 1.733| 0.66±1.73       | 0.666 | 1.733|
|                                       | >50                                  | 32   | 5.50±2.34       | 0.531| 1.930| 0.53±1.93       | 0.531 | 1.930|
| Education level                       | Primary school or literate           | 88   | 6.64±2.54       | 0.771| 0.511| 1.01±2.00       | 0.730 | 0.535|
|                                       | Middle/high school                   | 166  | 6.31±2.46       | 0.755| 1.946| 0.75±1.94       | 0.755 | 1.946|
|                                       | Undergraduate degree                 | 84   | 6.20±2.62       | 1.100| 2.673| 1.10±2.67       | 1.100 | 2.673|
|                                       | Postgraduate degree                  | 11   | 5.64±2.91       | 0.451| 1.512| 0.45±1.51       | 0.451 | 1.512|
| Marital status                        | Married                              | 240  | 0.88±2.17       | 0.040| 0.961| 6.06±2.57       | 5.155 | 0.071|
|                                       | Single                               | 90   | 0.94±2.07       | 0.845| 2.096| 0.94±2.07       | 0.845 | 2.096|
|                                       | Widowed/divorced                     | 19   | 0.84±2.19       | 0.716| 2.096| 0.71±2.09       | 0.716 | 2.096|
| Chronic disease                       | Present                              | 83   | 1.00±2.24       | 0.531| 0.596| 6.20±2.69       | -0.584| 0.560|
|                                       | Absent                               | 266  | 0.86±2.11       | 0.739| 2.494| 0.86±2.11       | 0.739| 2.494|
|                                       | Present                              | 103  | 0.87±1.95       | -0.098| 0.922| 6.19±2.63       | -0.727| 0.467|
|                                       | Absent                               | 246  | 0.90±2.22       | 0.641| 2.494| 0.64±2.49       | 0.641| 2.494|
| Are there any COVID-19 positive people| Yes                                 | 161  | 1.11±2.31       | 1.755| 0.174| 6.29±2.47       | 0.716| 0.490|
| around you?                           | No                                  | 165  | 0.67±1.73       | 6.32±2.54| 0.596| 0.67±1.73| 6.32±2.54| 0.596|
|                                       | I’m not sure                         | 23   | 1.00±3.23       | 6.96±2.93| 0.531| 1.00±3.23| 6.96±2.93| 0.531|
| If there is a COVID-19 positive       | At home in my family                 | 78   | 0.90±2.13       | 1.884| 0.155| 5.88±2.52       | 2.098| 0.126|
| person around you, where? (n=161)     | At the workplace                     | 42   | 0.90±2.28       | 6.71±2.48| 0.531| 0.90±2.28| 6.71±2.48| 0.531|
|                                       | Other                                | 41   | 1.71±2.61       | 6.63±2.29| 0.531| 1.71±2.61| 6.63±2.29| 0.531|
| Have you had a COVID-19 infection?    | Yes                                 | 35   | 5.54±2.99       | 2.580| 0.077| 1.63±2.72       | 2.606| 0.075|
|                                       | No                                  | 295  | 6.39±2.46       | 0.794| 2.065| 0.79±2.06       | 0.794| 2.065|
|                                       | I’m not sure                         | 19   | 7.05±2.48       | 1.151| 1.892| 1.15±1.89       | 1.151| 1.892|
| The amount of smoking during the      | Increased                           | 91   | 1.30±2.59       | 27.077| <0.001| 13.00±10.68| 4.529| 0.011|
| pandemic                              | Decreased                           | 35   | 1.46±3.12       | 20.88±13.27| 0.001| 14.6±3.12| 20.88±13.27| 0.001|
|                                       | Unchanged                           | 223  | 0.64±1.67       | 17.64±10.64| 0.001| 0.64±1.67| 17.64±10.64| 0.001|
|                                       | Sidak post hoc test                  | 1–2 p=0.001| 0.473| 0.624| 0.7±1.81| 2.007| 0.136|
|                                       |                                      | 1–3 p=0.005| 0.473| 0.624| 0.7±1.81| 2.007| 0.136|
|                                       |                                      | 2–3 p=0.001| 0.473| 0.624| 0.7±1.81| 2.007| 0.136|
| When did you decide to quit smoking?  | Before the epidemic began            | 182  | 6.35±2.55       | 0.473| 0.624| 0.7±1.81       | 2.007| 0.136|
|                                       | When the epidemic began              | 23   | 5.87±3.09       | 1.52±2.89| 0.001| 5.87±3.09| 1.52±2.89| 0.001|
|                                       | After the epidemic                   | 144  | 6.42±2.42       | 1.03±2.37| 0.001| 6.42±2.42| 1.03±2.37| 0.001|
|                                       | Yes                                 | 131  | 6.28±2.85       | -0.367| 0.728| 1.60±2.96       | 4.188| <0.001|
| Do you think the COVID-19 pandemic has| No                                  | 218  | 6.39±2.33       | 0.46±1.27| 0.001| 6.39±2.33| 0.46±1.27| 0.001|
| an impact on smoking cessation?       |                                      |      |                  |      |       |                  |      |       |

t: independent samples test. F: one way ANOVA.
The mean CAS total score was 0.89±2.13 (range: 0–20) and FTND total score obtained in the questionnaire was 6.3±2.5 (range: 0–10), while no statistically significant correlation was found between the FTND total score and the CAS total score (r=0.046, p=0.389).

Table 2 presents the analysis of results regarding the comparison of CAS and FTND total scores with different variables. The CAS was higher in women than in men (1.4±2.8 vs 0.6±1.6, p=0.005). CAS total mean scores were higher in widowed/divorced (7.16±2.09) than in married (6.06±2.57) or single (6.94±2.40) (p=0.006). The Coronavirus Anxiety Scale total score and the change in the amount of smoking during the pandemic were compared. The mean score of CAS was higher in those who reported that the amount of smoking decreased (20.88±13.27) than in those who reported that it increased (13.00±10.68) or did not change (17.64±10.64) (p=0.011). Finally, the mean score of the CAS was higher among those who thought the pandemic had an impact (1.60±2.96) than among those who said it had no impact on their thinking about quitting smoking (0.46±1.27) (p<0.001). According to this analysis, a statistically significant difference was found between the FTND total score and age (p=0.037) and changes in the amount of smoking during the pandemic (p<0.001).

Results of linear regression analysis between CAS total score and some variables
Table 3 shows the results of the multiple linear regression analysis performed to determine the variables predicting the total score of CAS. The results of the established model were statistically significant [F (5,343)=8.89, p<0.001]. The total score of CAS was 0.70 points higher in females than in males (β=0.70; 95% CI: 0.25–1.15, p=0.002). The total CAS score was 1.04 points higher among those who said that the COVID-19 pandemic had an impact on quitting smoking than among those who said it did not [β=1.04; 95% CI: 0.59–1.48, p<0.001]. The total score of CAS was 0.55 points higher among those who said the amount of smoking increased during the pandemic than among those who said it had decreased (β=0.55; 95% CI: 0.59–1.05, p=0.028). The variables ‘How did your smoking amount change during the pandemic?’ (β=0.71; p=0.054) and ‘Are there any COVID-19 positive people around the participants?’ (β=0.21, p=0.236) had no significant effect on the total score of CAS. It was found that the 11% variance in CAS score could be explained by gender and the variables ‘Does the COVID-19 pandemic have an effect on quitting smoking?’ and ‘The amount of smoking in the epidemic’ (R²=0.11).

Comparison of knowledge questions with different variables
As can be seen in Table 4, the impact of the COVID-19 pandemic on smoking cessation was statistically different between knowing that the rate of intensive care unit (ICU) admissions due to COVID-19 infection is higher in smokers, that smokers are heavily infected with COVID-19 and that the mortality rate due to COVID-19 infection is higher in smokers (p<0.001).
Table 4. Comparison of knowledge questions with different variables (N=349)

| Variables                              | Categories                                      | Smokers are heavily infected with COVID-19 | The rate of intensive care unit (ICU) admissions due to COVID-19 infection is higher in smokers | The mortality rate due to COVID-19 infection is higher among smokers |
|----------------------------------------|------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
|                                        |                                                | Wrong/no answer | Right | p   | Wrong/no answer | Right | p   | Wrong/no answer | Right | p   |
| Age (years)                            | ≤20                                            | 4 (36.4) | 7 (63.6) | 0.909 | 3 (27.3) | 8 (72.7) | 0.795 | 3 (27.3) | 8 (72.7) | 0.205 |
|                                        | 21–30                                          | 45 (42.5) | 61 (57.5) | 44 (41.5) | 62 (58.5) | 46 (43.4) | 60 (56.6) |
|                                        | 31–40                                          | 46 (42.6) | 62 (57.4) | 45 (41.7) | 63 (58.3) | 45 (41.7) | 63 (58.3) |
|                                        | 41–50                                          | 36 (39.1) | 56 (60.9) | 34 (37.0) | 58 (63.0) | 34 (37.0) | 58 (63.0) |
|                                        | >50                                            | 11 (34.4) | 21 (65.6) | 11 (34.4) | 21 (65.6) | 7 (21.9) | 25 (78.1) |
| Gender                                 | Male                                           | 52 (41.9) | 72 (58.1) | 0.725 | 52 (41.9) | 72 (58.1) | 0.446 | 56 (45.2) | 68 (54.8) | 0.065 |
|                                        | Female                                         | 90 (40.0) | 135 (60.0) |              | 85 (37.8) | 140 (62.2) |              | 79 (35.1) | 146 (64.9) |              |
| Education level                        | Primary school or literate                     | 32 (36.4) | 56 (63.6) | 0.564 | 34 (38.6) | 54 (61.4) | 0.389 | 32 (36.4) | 56 (63.6) | 0.773 |
|                                        | Middle/high school                             | 74 (44.6) | 92 (55.4) | 72 (43.4) | 94 (56.6) | 69 (41.6) | 97 (58.4) |
|                                        | Undergraduate degree                           | 32 (38.1) | 52 (61.9) | 27 (32.1) | 57 (67.9) | 30 (35.7) | 54 (64.3) |
|                                        | Postgraduate degree                            | 4 (36.4) | 7 (63.6) | 4 (36.4) | 7 (63.6) | 4 (36.4) | 7 (63.6) |
| Marital status                         | Married                                        | 95 (39.6) | 145 (60.4) | 0.756 | 90 (37.5) | 150 (62.5) | 0.393 | 89 (37.1) | 151 (62.9) | 0.661 |
|                                        | Single                                         | 38 (42.2) | 52 (57.8) | 37 (41.1) | 53 (58.9) | 38 (42.2) | 52 (57.8) |
|                                        | Widowed/divorced                               | 9 (47.4) | 10 (52.6) | 10 (52.6) | 9 (47.4) | 8 (42.1) | 11 (57.9) |
| Chronic disease                        | Present                                        | 28 (33.7) | 55 (66.3) | 0.140 | 25 (30.1) | 58 (69.9) | 0.051 | 26 (31.3) | 57 (68.7) | 0.115 |
|                                        | Absent                                         | 114 (42.9) | 152 (57.1) | 112 (42.1) | 154 (57.9) | 109 (41) | 157 (59) |
| Regular use of medication              | Present                                        | 37 (35.9) | 66 (64.1) | 0.241 | 35 (34) | 68 (66) | 0.192 | 35 (34.0) | 68 (66.0) | 0.243 |
|                                        | Absent                                         | 105 (42.7) | 141 (57.3) | 102 (41.5) | 144 (58.5) | 100 (40.7) | 146 (59.3) |
| Are there any COVID-19 positive people around you? | Yes | 69 (42.9) | 92 (57.1) | 0.664 | 63 (39.1) | 98 (60.9) | 0.405 | 62 (38.5) | 99 (61.5) | 0.638 |
|                                        | No                                             | 63 (38.2) | 102 (61.8) | 62 (37.6) | 103 (62.4) | 62 (37.6) | 103 (62.4) |
|                                        | I’m not sure                                   | 10 (43.5) | 13 (56.5) | 12 (52.2) | 11 (47.8) | 11 (47.8) | 12 (52.2) |
| If there is a COVID-19 positive person around you, where? | At home in my family | 31 (39.7) | 47 (60.3) | 0.455 | 32 (41) | 46 (59) | 0.851 | 31 (39.7) | 47 (60.3) | 0.713 |
|                                        | At the workplace                               | 17 (40.5) | 25 (59.5) | 15 (35.7) | 27 (64.3) | 14 (33.3) | 28 (66.7) |
|                                        | Other                                          | 21 (51.2) | 20 (48.8) | 16 (39) | 25 (61) | 17 (41.5) | 24 (58.5) |
|                                        | Yes                                            | 17 (48.6) | 18 (51.4) | 0.062 | 16 (45.7) | 19 (54.3) | 0.145 | 15 (42.9) | 20 (57.1) | 0.813 |
|                                        | No                                             | 113 (38.3) | 182 (61.7) | 110 (37.3) | 185 (62.7) | 112 (38) | 183 (62) |
|                                        | I’m not sure                                   | 12 (63.2) | 7 (36.8) | 11 (57.9) | 8 (42.1) | 8 (42.1) | 11 (57.9) |
| The amount of smoking during the pandemic | Increased | 40 (44) | 51 (56) | 0.031 | 38 (41.8) | 53 (58.2) | 0.110 | 41 (45.1) | 50 (54.9) | 0.072 |
|                                        | Decreased                                      | 7 (20) | 28 (80) | 8 (22.9) | 27 (77.1) | 8 (22.9) | 27 (77.1) |
|                                        | Unchanged                                      | 95 (42.6) | 128 (57.4) | 91 (40.8) | 132 (59.2) | 86 (38.6) | 137 (61.4) |

Continued
**DISCUSSION**

During epidemics, the number of people whose mental health is affected tends to be higher than the number of people affected by the infection\(^{24}\), with fear and stress as widespread strong emotions\(^{22}\). During a pandemic, fear increases anxiety levels in healthy people and exacerbates symptoms of pre-existing psychiatric disorders\(^{23}\). Several studies have found that anxiety levels in the general population have been high since the beginning of the COVID-19 era\(^{24}\). The study of more than 1200 people in China showed that 29% of participants suffered from moderate to severe anxiety during the pandemic\(^{25}\).

Healthcare workers, in particular, struggle with psychological problems such as predominantly fear and anxiety during a pandemic. In the study of Lu et al.\(^{26}\), employees of departments that have close contact with patients and are exposed to high levels of aerosols have a 2-fold higher risk of suffering from fear, anxiety, and depression than employees of departments that have relatively little contact and exposure to aerosols.

A study on stress perception of Italian athletes revealed that male athletes had lower stress perception than female athletes during the COVID-19 quarantine\(^{27}\). Our study also revealed that fear of COVID-19 was higher in female participants. There are many studies showing that the increased stress of a disease with high morbidity and mortality, such as COVID-19, causes an increase in negative emotions such as hopelessness, anxiety, fear of infection due to isolation and curfews, which are among the measures taken, and changes in smoking behavior\(^{28-30}\). It was observed that the pandemic caused some smokers to increase smoking while other smokers reduced smoking\(^{31-35}\).

The association between the high mortality and morbidity rates in people infected with COVID-19 and

| Variables | Categories | Smokers are heavily infected with COVID-19 | The rate of intensive care unit (ICU) admissions due to COVID-19 infection is higher in smokers | The mortality rate due to COVID-19 infection is higher among smokers |
|-----------|------------|-------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------|
|           |            | Wrong/no answer | Right | p          | Wrong/no answer | Right | p          | Wrong/no answer | Right | p          |
| When did you decide to quit smoking? | Before the epidemic began | 80 (44) | 102 (56) | 0.336 | 75 (41.2) | 107 (58.8) | 0.715 | 81 (44.5) | 101 (55.5) | 0.064 |
| | When the epidemic began | 7 (30.4) | 16 (69.6) | | 8 (34.8) | 15 (65.2) | 8 (34.8) | 15 (65.2) | |
| | After the epidemic | 55 (38.2) | 89 (61.8) | | 54 (37.5) | 90 (62.5) | 46 (31.9) | 98 (68.1) | |
| Do you think the COVID–19 pandemic has an impact on smoking cessation? | Yes | 28 (21.4) | 103 (78.6) | <0.001 | 28 (21.4) | 103 (78.6) | <0.001 | 27 (20.6) | 104 (79.4) | <0.001 |
| | No | 114 (52.3) | 104 (47.7) | 109 (50) | 109 (50) | 108 (49.5) | 110 (50.5) | |
| Nicotine dependence according to FTND | Very mild | 12 (37.5) | 20 (62.5) | 0.756 | 12 (37.5) | 20 (62.5) | 0.382 | 12 (37.5) | 20 (62.5) | 0.422 |
| | Mild | 21 (43.8) | 27 (56.3) | 19 (39.6) | 29 (60.4) | 15 (31.3) | 33 (68.8) | |
| | Moderate | 20 (48.8) | 21 (51.2) | 22 (53.7) | 19 (46.3) | 21 (51.2) | 20 (48.8) | |
| | Severe | 37 (37.4) | 62 (62.6) | 36 (64.4) | 63 (63.6) | 38 (60.3) | 51 (61.6) | |
| | Extremely severe | 52 (40.3) | 77 (59.7) | 48 (37.2) | 81 (62.8) | 49 (36.9) | 80 (63) | |

Data are given as n (%), where percentages are for right or wrong/no answer. Pearson chi-squared test. FTND: Fagerström test for nicotine dependence.
smoking can be seen as a motivating factor for people to quit smoking. Our study found that about a quarter of the participants increased their smoking amount during the pandemic. In a study conducted with 1359 smokers in the US, about half of the smokers reported that their smoking amount had not changed during the pandemic, whereas 22% reported smoking more. However, a study from the United Kingdom showed that a quarter of smokers smoked more during the pandemic and that mental health and psychosocial well-being were strongly related to tobacco use.

The increase in smoking amount during the pandemic among those with higher COVID-19 anxiety levels in our study supports the finding of the UK study. The literature suggests that some nicotine withdrawal symptoms may resemble the physiological stress response and contribute to an increase in stress-related smoking cravings. It is also suggested that nicotine dependence is the initial reason for the continuation of smoking behavior and overall failure of treatment attempts. In a study conducted by Örsel et al., 33% of patients presenting to the smoking cessation polyclinic were highly dependent on nicotine. More than two-thirds of the participants were considered extremely nicotine dependent in our study, which could explain the increase in smoking during the pandemic and only half of the decrease in smoking cessation and smoking amount among those who were examined.

We observed that those who had increased smoking during the pandemic were more stressed and more dependent. We can explain this result by the fact that people, especially those with high addiction potential, turn to addictive substances to relieve their negative feelings, as found in one study. In our study, we determined that those who thought that the COVID-19 pandemic had an impact on smoking cessation and that they knew that the rate of ICU hospitalization and death was higher among smokers infected with COVID-19 had decreased the amount of cigarette or hookah smoking.

Limitations
The limitations of the study are that it only measures the level of anxiety in smokers who visited our smoking cessation outpatient clinic during the pandemic, that it measures the effect of COVID-19 on smoking behavior only with the level of anxiety, and that it does not address the frequency of smoking and anxiety level in the community during the pandemic. In addition, the small number of participants and the fact that it was conducted in a single center are other limitations of the study. On the contrary, the limited number of studies on the association between the level of anxiety due to COVID-19 and smoking can be considered as a strength of our study. Future studies will better illuminate the long-term effects of this pandemic on smoking behavior by examining the smoking status of those who quit smoking or those who never smoked during the pandemic.

CONCLUSIONS
Pandemic-related anxiety is a factor in the decision to quit smoking. It has been observed that individuals who have high levels of pandemic anxiety due to COVID-19 quit smoking and reduced the number of cigarettes they smoked at the onset of the pandemic. The level of anxiety related to COVID-19 is higher among females and individuals who smoke during the pandemic. The knowledge that COVID-19 infection is severe in smokers is one of the effective factors in the decision to quit smoking during the pandemic. We will not be able to thoroughly examine the factors that influence pandemic-related anxiety until the pandemic is over. What we need to do in the current pandemic is to intervene early in patients who develop anxiety symptoms and turn this situation into an opportunity for healthy behaviors such as eliminating harmful habits like tobacco addiction. In the time of the pandemic, we need more than ever training for health professionals, both for the fight against the pandemic and for preventive and curative healthcare.

REFERENCES
1. World Health Organization. ICD-11 for Mortality and Morbidity Statistics (Version : 02/2022): 6C4A.2 Nicotine dependence. Accessed November 14, 2021. https://icd.who.int/browse11/l-m/en#/http://id.who.int/icd/entity/1699574100
2. Velioglu U, Sönmez CI. Sigara Birakma Polikliniğine Başvuran Hastaların Nikotin Bağımlılığının Sosyo demografi Özellikler ve Depresyon İle İlişkisi. Dicle Tıp Dergisi. 2018;45(1):35-41. doi:10.5798/dicletip.407242
3. Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia. N Engl J Med. 2020;382(13):1199-1207. doi:10.1056/nejmoa2001316
4. Dodd C, Schneider N. Emergency and intensive
care medicine aspects of COVID-19 infections. Notfallmedizinische und intensivmedizinische Aspekte von COVID-19-Infectionen. Radiologe. 2020;60(10):899-907. doi:10.1007/s00117-020-00742-x
5. Leung JM, Yang C, Tam A, et al. ACE-2 expression in the small airway epithelia of smokers and COPD patients: Implications for COVID-19. Eur Respir J. 2020;55(5). doi:10.1183/13993003.00688-2020
6. Patanavanich R, Glantz SA. Smoking is associated with COVID-19 progression: A meta-analysis. Nicotine Tob Res. 2020;22(9):1653-1656. doi:10.1093/ntt/ntaa082
7. World Health Organization. Smoking and COVID-19. World Health Organization; 2020. Accessed November 30, 2021. https://www.who.int/publications/i/item/WHO-2019-nCoV-Sci_Brief-Smoking-2020
8. Ren X. Pandemic and lockdown: a territorial approach to COVID-19 in China, Italy and the United States. Eurasian Geogr Econ. 2020;61(4-5):423-434. doi:10.1080/15387216.2020.1762103
9. Fierros G, Antonio E. Book Review. The Psychology of Pandemics: Preparing for the Next Global Outbreak of Infectious Disease, Steven Taylor (Cambridge Scholars Publishing, 2019), pp. 179. Psicologia Iberoamericana. 2020;28:0-4. Accessed November 30, 2021. https://www.redalyc.org/articulo.oa?id=133964928002
10. Lee SA. Coronavirus Anxiety Scale: A brief mental health screener for COVID-19 related anxiety. Death Stud. 2020;44(7):393-401. doi:10.1080/07481187.2020.1748481
11. Ransing R, Ramalho R, Orsolini L, et al. Can COVID-19 related mental health issues be measured? Brain Behav Immun. 2020;88:32-34. doi:10.1016/j.bbi.2020.05.049
12. Ladikli N, Bahadir E, Yumuşak FN, Akkuzu H, Karaman G, Türkkan Z. Kovid-19 Korkusu Ölçeğinin Türkçe Güvenilirlik ve Geçerlilik Çalışması. Uluslararası Sosyal Bilimler Dergisi. 2020;3(2):71-80. Accessed November 30, 2021. https://dergipark.org.tr/tr/download/article-file/1219747
13. Sidor A, Rzymski P. Dietary choices and habits during COVID-19 lockdown: Experience from Poland. Nutrients. 2020;12(6):1-13. doi:10.3390/nu12061657
14. Kayhan Tetik B, Gedik Tekinemre I, Taş S. The Effect of the COVID-19 Pandemic on Smoking Cessation Success. J Community Health. 2021;46(3):471-475. doi:10.1007/s10900-020-00880-2
15. Uysal MA, Kadakal F, Karşıdağ C, Bayram NG, Uysal O, Yılmaz V. Fagerstrom test for nicotine dependence : reliability in a Turkish sample and factor analysis. Tuberk Toraks. 2004;52(2):115-121. Accessed November 30, 2021. http://www.tuberkторакс.org/managete/facefolder/2004-02/2004-52-2-115-121.pdf
16. Tabachnick BG, Fidell LS. Using Multivariate Statistics. 4th ed. Allyn and Bacon; 2000.
17. Miller RG Jr. Simultaneous Statistical Inference. McGraw-Hill Book Company; 1966.
18. Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika. 1951;16(3):297-334. doi:10.1007/BF02310555
19. Nunnally JC, Bernstein IH. Psychometric Theory. 3rd ed. McGraw-Hill Book Company; 1994.
20. Bowling A, Ebrahim S, eds. Handbook of Health Research Methods: Investigation, measurement and analysis. McGraw-Hill Education; 2005.
21. News in focus. Nurs Older People. 2001;13(2):5-5. doi:10.7748/nop.13.2.5.s5
22. Mehrafar AH, Moghadam Zadeh A, Jaenes Sánchez JC, Gazerani P. Competitive anxiety or Coronavirus anxiety? The psychophysiological responses of professional football players after returning to competition during the COVID-19 pandemic. Psychoneuroendocrinology. 2021;129:105269. doi:10.1016/j.psyneuen.2021.105269
23. Shigemura J, Ursano RJ, Morganstein JC, Kurosawa M, Benedek DM. Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. Psychiatry Clin Neurosci. 2020;74(4):281-282. doi:10.1111/pcn.12988
24. Mazza C, Ricci E, Biondi S, et al. A nationwide survey of psychological distress among Italian people during the covid-19 pandemic: Immediate psychological responses and associated factors. Int J Environ Res Public Health. 2020;17(9):1-14. doi:10.3390/ijerph17093165
25. Cullen W, Gulati G, Kelly BD. Mental health in the COVID-19 pandemic. JQM. 2020;113(5):311-312. doi:10.1093/JQMED/HCAA110
26. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. Psychiatry Res. 2020;288:1-5. doi:10.1016/j.psychres.2020.112936
27. di Fronso S, Costa S, Montesano C, et al. The effects of COVID-19 pandemic on perceived stress and psychobiosocial states in Italian athletes. Int J Sport Exerc Psychol. 2020;20(1):79-91. doi:10.1080/1935-2076.X.2020.1802612
28. Sokolovsky AW, Hertel AW, Micalizzi L, White HR, Hayes KL, Jackson KM. Preliminary impact of the COVID-19 pandemic on smoking and vaping in college students. Addict Behav. 2021;115:106783. doi:10.1016/j.addbeh.2020.106783
29. Gao J, Zheng P, Jia Y, et al. Mental health problems and associated factors. Int J Environ Res Public Health. 2020;17(9):1-10. doi:10.3390/ijerph17093165
30. Dong L, Bouey J. Public Mental Health Crisis during COVID-19 Pandemic, China. Emerg Infect Dis. 2020;26(7):1616-1618. doi:10.3201/eid2607.200407
31. Gao J, Zheng P, Jia Y, et al. Mental health problems and social media exposure during COVID-19 outbreak. PLoS One. 2020;15(4):1-10. doi:10.1371/journal.pone.0231924
32. Grundy EJ, Suddek I, Filippidis FT, Majeed A, Coronini-Cronberg S. Smoking, SARS-CoV-2 and COVID-19: A review of reviews considering implications for public health policy and practice. Tob Induc Dis. 2020;18(July):1-11. doi:10.18332/TID/124788
33. Bommelé J, Hopman P, Walters BH, et al. The double-edged relationship between COVID-19 stress and smoking: Implications for smoking cessation. Tob Induc
Research Paper

Tobacco Induced Diseases
Tob. Induc. Dis. 2022;20(June):55
https://doi.org/10.18332/tid/149180

33. Gendall P, Hoek J, Stanley J, Jenkins M, Every-Palmer S. Changes in Tobacco Use during the 2020 COVID-19 Lockdown in New Zealand. Nicotine Tob Res. 2021;23(5):866-871. doi:10.1093/ntr/nta257
34. Chen DTH. The psychosocial impact of the COVID-19 pandemic on changes in smoking behavior: Evidence from a nationwide survey in the UK. Tob Prev Cessat. 2020;6(October):1-5. doi:10.18332/tpc/126976
35. Klemperer EM, West JC, Peasley-Miklus C, Villanti AC. Change in tobacco and electronic cigarette use and motivation to quit in response to COVID-19. Nicotine Tob Res. 2020;22(9):1662-1663. doi:10.1093/ntr/ntaa072
36. DiClemente RJ, Capasso A, Ali SH, Jones AM, Foreman J, Tozan Y. Knowledge, beliefs, mental health, substance use, and behaviors related to the COVID-19 pandemic among US adults: a national online survey. J Public Heal. 2021. doi:10.1007/s10389-021-01564-4
37. Richards JM, Stipelman BA, Bornovalova MA, Daughters SB, Sinha R, Lejuez CW. Biological mechanisms underlying the relationship between stress and smoking: State of the science and directions for future work. Biol Psychol. 2011;88(1):1-12. doi:10.1016/j.biopsycho.2011.06.009
38. The Tobacco Use and Dependence Clinical Practice Guideline Panel, Staff, and Consortium Representatives. A Clinical Practice Guideline for Treating Tobacco Use and Dependence: A US Public Health Service Report. JAMA. 2000;283(24):3244-3254. doi:10.1001/jama.283.24.3244
39. Örsel O, Örsel S, Alpar S, et al. Sigara bırakmada nikotin bağımlılık düzeylerinin tedavi sonuçlarına etkisi. Solunum Hastalıkları. 2005;16:112-118. Accessed November 30, 2021. https://app.trdizin.gov.tr/makale/TlRReE5EQXc/ sigara-birakmada-nikotin-bagimlilik-duzeylerinin-tedavi-sonucilari-etkisi
40. Marsden J, Darke S, Hall W, et al. Mitigating and learning from the impact of COVID-19 infection on addictive disorders. Addiction. 2020;115(6):1007-1010. doi:10.1111/add.15080
41. Lawless MH, Harrison KA, Grandits GA, Eberly LE, Allen SS. Perceived stress and smoking-related behaviors and symptomatology in male and female smokers. Addict Behav. 2015;51:80-83. doi:10.1016/j.addbeh.2015.07.011

CONFLICTS OF INTEREST
The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

FUNDING
There was no source of funding for this research.

ETHICAL APPROVAL AND INFORMED CONSENT
The ethics committee of the Başakşehir Çam and Sakura City Hospital, approved the study protocol (Approval number: 98; Date: 26 May 2021). Informed consent was obtained from the participants.

DATA AVAILABILITY
The data supporting this research are available from the authors on reasonable request.

PROVENANCE AND PEER REVIEW
Not commissioned; externally peer reviewed.