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## Determination of the Nutritional Habits and Anxiety Levels in Individuals with COVID-19 in Turkey

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# Determination of the Nutritional Habits and Anxiety Levels in Individuals with COVID-19 in Turkey

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## Abstract

**Background:** Coronavirus disease 2019 (COVID-19), which has spread worldwide since December 2019, has infected and claimed the lives of millions of people. This study aimed to investigate the relationship between anxiety levels and nutritional habits of patients with COVID-19.

**Methods:** This cross-sectional study enrolled patients diagnosed with COVID-19 between February 1, 2021 and May 1, 2021. The study population included a total of 108 individuals with COVID-19 residing in Artvin, Turkey. This study used a self-administered online questionnaire, containing 40 questions from the State and Trait Anxiety Scale.

**Results:** The state anxiety score was 37.26, and the trait anxiety score was 39.98. A strong, positive, and significant relationship was found between the state and trait anxiety levels of the participants ( $r = 0.588$ ;  $p < 0.001$ ).

**Conclusions:** Many individuals who recovered from COVID-19 still suffer and struggle with the residual symptoms of COVID-19 for several months. Symptoms such as fatigue, weakness, pain, and malnutrition may occur even after recovery.

**Keywords:** anxiety, COVID-19, nutrition habits, pandemic

## INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic, which has been present for more than a year, has infected and claimed the lives of millions of people.<sup>1</sup> Severe pneumonia, acute respiratory distress syndrome, multiple organ failure, and death may occur in some patients, although some show mild or no symptoms at all.<sup>2,3</sup> Healthy individuals who contacted COVID-19 may have a severe disease course, regardless of age, but its incidence is higher in older adults or those with underlying comorbidities, such as hypertension, cardiovascular disease, diabetes mellitus, chronic lung disease, cancer, chronic kidney disease, and obesity.<sup>4</sup> Chronic infection not only affects the prognosis but also exacerbates existing chronic diseases or causes acute and chronic complications such as septic shock, coagulation disorder, and heart, kidney, and liver damage.<sup>5</sup> In addition, an impairment in the ratio of oxygen to carbon dioxide causes overstimulation of the sympathetic nervous system and, consequently, narrowing of the peripheral vessels and increased left ventricular afterload. Persistent fever lasting for an average of 4 days, hypotension, abdominal pain, diarrhea, nausea, headache, myocarditis, and laboratory

findings indicating severe inflammation were observed in nearly all individuals with COVID-19.<sup>6,7</sup>

Such patients should receive biological, psychological, social, and cultural support, and nutrition is among the most important.<sup>8</sup> Although effective preventive or curative methods for COVID-19 are not yet clear, a strong immune system may be protective. Adequate and balanced nutrition is one of the essential strategies to improve and maintain immune system functions.<sup>9</sup> During the COVID-19 pandemic, adopting a healthy lifestyle, eating fruits and vegetables, exercising, maintaining healthy bodyweight, and sleeping adequately are reported to improve the immune system.<sup>10</sup> Physical distancing and social isolation have affected the quality of life, especially eating habits and daily physical activities.<sup>11</sup> The necessity of staying at home for a longer time than normal living conditions increased the risk of consuming less nutritious foods with a longer shelf life and higher contents of salt, sugar, trans fat, and calories.<sup>12</sup> The loss of taste and smell was reported by many people with COVID-19, which either accompanied other symptoms of COVID-19 or presented alone. Optimal nutrition required for a strong immunity may not be achieved because of the loss of taste and smell, which negatively affects the nutritional habits of the individuals' affected.<sup>13</sup>

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The COVID-19 pandemic is not only a public health issue but also a social, demographic, and economic crisis and has negative psychosocial effects. The psychological effects of the outbreak are still being discussed, with a gradual relaxation of containment measures against the

pandemic and slow return to normal social living. The number of people experiencing high levels of chronic fear and anxiety has increased as the death toll and distress caused by COVID-19 continue to rise.<sup>14,15</sup> Anxiety causes physical and mental symptoms that vary with each person, presenting emotionally and psychologically. Various opinions are put forward about the transmission and treatment methods of COVID-19, which considerably led to death, deepen uncertainty about the disease, and increase the anxiety level.<sup>16</sup> This study was conducted to evaluate the nutritional habits and anxiety levels of individuals with COVID-19.

## METHODS

Ethics committee approval was obtained from Artvin Çoruh University (dated January 1, 2021, no. E.2430), and verbal informed consent was obtained from the participants whose data were collected. Those who refused to participate were excluded from the study. This cross-sectional study, using data collected according to the sampling technique by Urzi and Leo,<sup>17</sup> was conducted to determine whether a significant difference exists between the anxiety levels and nutritional habits of the participants. Patients diagnosed with COVID-19 between February 1, 2021 and May 1, 2021 were included. The number of patients with COVID-19 in Artvin was determined according to the data of the Turkish Ministry of Health, during the period from February 1, 2021 and May 1, 2021. The minimum number of participants to represent the universe was 108.<sup>18,19</sup> A total of 108 people with COVID-19 in Artvin constituted the study population. Volunteers were contacted online and agreed to participate in the study. The state-trait anxiety inventory (STAI) questionnaire was administered to the participants.

Research data were collected online through an easy sampling method to eliminate the risk of COVID-19 transmission. The online questionnaire consisted of 40 questions. The questionnaire was sent through a web link during the period from February 1, 2021 and May 1, 2021. The STAI, which was developed by Spielberg *et al.*<sup>20</sup> and adapted to Turkish by Öner and Le Compte,<sup>21</sup> was used to determine the anxiety levels of the participants. The scale includes two separate measurement tools consisting of a total of 40 items. The "State Anxiety Scale" contains 20 questions that evaluate whether individuals find themselves in a state of anxiety at a certain moment and under certain conditions, while the "Trait Anxiety Scale" contains 20 items that measure how individuals constantly feel during an anxious situation. Both scales have 10 reversed items: a high score indicates a high anxiety level, while a low score indicates a low anxiety level. The State Anxiety Scale is a highly sensitive measure of assessing rapidly changing emotional reactions. The Trait Anxiety Scale measures the continuity of anxiety that a person is susceptible; scores range from 20 (low anxiety) to 80 (high anxiety) points. The Cronbach alpha reliability coefficients

of the scales range from 0.94 to 0.96 for the state anxiety scale and from 0.83 to 0.87 for the Trait Anxiety Scale. In addition to the anxiety scales, a sociodemographic characteristics form was administered, involving questions about demographic characteristics (gender, age, marital status, education, etc.) and nutritional habits of the participants.

Data obtained from the sample, including state and trait anxiety levels, were analyzed using the SPSS 20 statistical package program. The average scores of the anxiety-related answers were analyzed to determine whether a significant difference exists between demographic characteristics and eating habits. Independent sample t-test and one-way analysis of variance methods were used in the analysis. Correlation analysis was performed to examine whether a significant difference is present between the eating status and anxiety levels of the participants. Two methods were employed to examine whether a significant difference exists between dependent and independent variables, namely, independent sample t-test, where the dependent variable has a maximum of two categories, and the one-way analysis of variance (ANOVA), where the dependent variable has a minimum of three or more categories. In this context, the t-test was employed in the difference analysis, and one-way ANOVA was used for independent samples.

## RESULTS

The demographic characteristics of the participants are presented in Table 1. Women comprised 60.2% of the sample. The age ranged from 36 to 45 years in 36.1% of the participants (largest group), while those aged 18–25 and >46 years made up 16.7% of the participants (smallest group). Moreover, 37.9% and 24% of the participants had a bachelor's degree and postgraduate diploma, respectively. Regarding marital status, 36.1% were married. In addition, 79.6% were nonsmokers, and 91.7% were not alcoholics.

Results of the descriptive analysis related to the eating status of the participants are summarized in Table 2. Overall, 91.7% of the participants were diagnosed with COVID-19 by a healthcare professional, of which 41.7% used the prescribed medicines. Of these patients with COVID-19, 64.8% used herbal products or supplements to strengthen their immunity.

The hospitalization rate was 3.7%, whereas 96.3% stayed at home. The eating habits totally changed in 35.2% of the participants with COVID-19, partially changed in 33.3%, and did not change in 31.5%. Moreover, 51.9% reported eating two meals a day, 39.8% eating three, and 8.3% eating  $\geq 4$ . Regarding daily water consumption, 18.5% of the participants consumed <1 L, 46.3% drank 1–2 L, 31.5% consumed 2–3 L, and 3.7% drank >3 L per day.

**TABLE 1.** Demographic characteristics of the study participants (N=108)

Demographic characteristics	N	%
<b>Age</b>		
18-25 years old	18	16.7
26-35 years old	33	30.6
36-45 years old	39	36.1
≥46 years old	18	16.7
<b>Education</b>		
Elementary education	10	9.3
High school	20	18.5
Associate degree	12	11.1
Undergraduate	40	37.9
Postgraduate	26	24.0
<b>Gender</b>		
Female	65	60.2
Male	43	39.8
<b>Marital status</b>		
Married	39	36.1
Single	69	66.9
<b>Smoking</b>		
Yes	22	20.4
No	86	79.6
<b>Alcohol</b>		
Yes	9	8.3
No	99	91.7

Furthermore, 5.6% of the participants had regular physical activity, 18.5% performed physical activity from time to time, and 75.9% did not perform any physical activity at all during the disease period. Bodyweight increased in 9.3% of the participants, decreased in 47.2%, and remained the same in 43.5%.

In this study, the state and trait anxiety scores were 37.26 and 39.98, respectively. A strong positive and significant relationship was determined between the state and trait anxiety levels of the participants ( $r = 0.588$ ;  $p < 0.001$ ).

In Table 3, differences in the scores obtained from the state and trait anxiety scales were examined using the independent sample t-test in terms of the demographic characteristics and nutritional status of the participants. Since the skewness and kurtosis values, which indicate whether the data are normally distributed, are between +2 and -2, the scores were found to have a normal distribution.<sup>22</sup> Accordingly, a significant difference was not found between the state anxiety and trait anxiety levels with respect to the marital status (single or married), alcohol use (yes or no), diagnosis of COVID-19 (by a healthcare professional or not), and drugs provided by the Ministry of Health (drugs were used or not) ( $p > 0.05$ ). However, a significant difference was found between gender distributions and trait anxiety levels, in favor of the male participants. Moreover, a significant difference was found between the variables that COVID-19 diagnosis was made by a healthcare professional and trait anxiety levels in favor of those responding "no".

**TABLE 2.** COVID-19 diagnosis process and nutritional status of the participants (N = 108)

Diagnosis Questions	N	%
<b>Have you been diagnosed with COVID-19 by healthcare personnel?</b>		
Yes	99	91.7
No	9	8.3
<b>Have you used the medicines given by the ministry of health?</b>		
Yes	45	41.7
No	63	58.3
<b>Have you used herbal products or supplements to strengthen your immunity?</b>		
Yes	70	64.8
No	38	35.2
<b>Have you been hospitalized after being diagnosed with COVID-19?</b>		
No	104	96.3
3-5 days	1	0.9
6-8 days	1	0.9
≥9 days	2	1.9
<b>Did your eating habits change while you were sick with COVID-19?</b>		
Yes	38	35.2
Partially	36	33.3
No	34	31.5
<b>How many meals did you eat in a day when you were sick with COVID-19?</b>		
2 meals	56	51.9
3 meals	43	39.8
≥4 meals	9	8.3
<b>How many liters of water did you consume daily when you were sick with COVID-19?</b>		
<1 liter	20	18.5
1-2 liters	50	46.3
2-3 liters	34	31.5
≥3 liters	4	3.7
<b>How much did you consume tea and coffee daily while sick with COVID-19?</b>		
1 cup	32	29.6
2-3 cups	51	47.2
3-5 cups	12	11.1
≥5 cups	13	12.0
<b>Did you do any physical activity while you were sick with the COVID-19?</b>		
Yes	6	5.6
Partially	20	18.5
No	82	75.9
<b>What was the change in body weight while suffering from COVID-19?</b>		
Increased	10	9.3
Not changed	47	43.5
Decreased	51	47.2

Table 4 shows the results summarizing whether a significant relationship was found between the state and trait anxiety levels of the participants and some demographic characteristics (age, income distribution, and educational status) and nutritional status. Accordingly, no significant difference was found between

the age, income, educational status, smoking status, and daily amount of water consumption and the state and trait anxiety levels. However, significant differences were found between some variables related to the nutritional status and the state and trait anxiety levels of the participants. A significant difference was found between the state anxiety levels of the participants and whether their eating habits changed (yes or no) throughout the disease course. One-way ANOVA was used to determine whether the state anxiety levels were changed with

respect to the eating habits of the participants. According to Scheffe's results, indicating which groups displayed a difference, the state anxiety levels of the participants showed a significant difference in favor of those reporting a partial change in eating habits (mean difference = 0.390) when compared with those who reported no change. Significant difference was found between the physical activity of the participants and their state anxiety levels throughout the disease course.

**TABLE 3.** State and Trait Anxiety Inventory average scores according to the demographic characteristics and nutritional status of the participants (N = 108)

Variables	N	State Anxiety			Trait Anxiety		
		Mean	SD	<i>p</i>	Mean	SD	<i>p</i>
<b>Gender</b>							
Female	65	39.16	0.515	0.254	40.14	0.377	0.048*
Male	43	32.25	0.531		36.17	0.361	
<b>Marital status</b>							
Single	39	33.01	0.544	0.122	37.16	0.399	0.685
Married	69	38.41	0.504		38.01	0.365	
<b>Alcohol</b>							
Yes	9	31.30	0.446	0.190	40.08	0.225	0.167
No	99	35.45	0.546		41.16	0.384	
<b>Have you been diagnosed with COVID-19 by healthcare personnel?</b>							
Yes	99	33.08	0.498	0.006*	34.15	0.347	0.002*
No	9	39.16	0.644		51.02	0.499	
<b>Have you used the medicines given by the ministry of health?</b>							
Yes	45	32.05	0.562	0.091	30.03	0.408	0.174
No	63	37.07	0.484		30.08	0.349	
<b>Have you used herbal products or supplements to strengthen your immunity?</b>							
Yes	70	33.45	0.521	0.485	35.64	0.380	0.384
No	38	44.25	0.528		38.45	0.368	

\**p* < 0.05

**TABLE 4.** Mean scores of the State and Trait Anxiety Inventory according to the demographic characteristics and nutritional status of the participants (N = 108)

Variables	State Anxiety				Trait Anxiety			
	N	Mean	SD	<i>p</i>	N	Mean	SD	<i>p</i>
<b>Age</b>								
18-25	18	30.45	0.632	0.106	18	30.05	0.400	0.438
26-35	33	30.26	0.448		33	39.07	0.313	
36-45	39	39.25	0.515		39	42.54	0.451	
≥46	18	40.15	0.499		18	39.07	0.258	
<b>Income distribution</b>								
Income > Expense	32	32.21	0.491	0.275	32	40.19	0.381	0.098
Income = Expense	51	38.25	0.550		51	41.18	0.368	
Income < Expense	25	41.20	0.496		25	52.25	0.365	
<b>Education</b>								
Elementary education	10	32.01	0.373	0.989	10	46.50	0.184	0.188
High school	20	47.54	0.661		20	48.25	0.488	
Associate degree	12	33.05	0.523		12	48.23	0.365	
Undergraduate	40	30.12	0.512		40	48.26	0.370	
Postgraduate	26	33.45	0.503		26	30.03	0.310	
<b>Smoking</b>								
No	86	29.05	0.502	0.062	36	47.25	0.344	0.146
Yes	22	46.20	0.458		72	41.36	0.388	

Table 4. Continues

Variables	State Anxiety				Trait Anxiety			
	N	Mean	SD	<i>p</i>	N	Mean	SD	<i>p</i>
<b>Did your eating habits change while you were sick with COVID -19?</b>								
Yes	38	39.26	0.468	0.005*	38	44.12	0.387	0.257
Partially	36	29.38	0.588		36	36.50	0.383	
No	34	38.87	0.432		34	38.25	0.350	
<b>How many meals did you eat in a day when you were sick with COVID -19?</b>								
2 meals	56	41.25	0.485	0.001*	18	40.25	0.400	0.038*
3 meals	43	40.86	0.481		33	40.57	0.313	
≥4 meals	9	39.12	0.599		39	40.01	0.451	
<b>How many liters of water did you consume daily when you were sick with COVID -19?</b>								
<1 liter	20	40.01	0.472	0.755	32	40.23	0.381	0.354
1-2 liters	50	39.25	0.561		51	41.02	0.368	
2-3 liters	34	36.14	0.527		25	39.18	0.365	
≥3 liters	4	37.28	0.143		4	38.38	0.359	
<b>How much did you consume tea and coffee daily while sick with COVID -19?</b>								
1 cup	32	40.26	0.506	0.014*	32	38.46	0.390	0.197
2-3 cups	51	36.49	0.497		51	40.24	0.345	
3-5 cups	12	37.25	0.330		12	35.25	0.296	
≥5 cups	13	37.91	0.639		13	36.29	0.486	
<b>Did you do any physical activity while you were sick with the COVID -19?</b>								
Yes	6	36.75	0.629	0.005*	6	39.00	0.347	0.120
Partially	20	38.56	0.347		20	39.45	0.279	
No	82	38.97	0.522		82	40.14	0.382	
<b>What was the change in body weight while suffering from COVID -19?</b>								
Increased	10	39.44	0.431	0.020*	10	34.25	0.344	0.142
Not changed	47	40.35	0.474		47	36.45	0.359	
Decreased	51	40.63	0.550		51	39.01	0.389	

\**p* < 0.05

## DISCUSSION

The COVID-19 pandemic causes serious threats to the physical health and lives of people worldwide. It induces malnutrition, panic disorder, anxiety disorder, and various psychological problems such as depression.<sup>23,24</sup> Understanding the subjective experiences of individuals with COVID-19, including how they were affected by the disease and by the quarantine process and how they coped with the fear of death, can facilitate the development of more functional and effective intervention strategies. Hence, in this study, we tried to understand the experience of individuals with COVID-19 during the disease process and to describe the effects of the disease on their eating habits. In addition, anxiety levels of those who recovered from COVID-19 were evaluated in terms of variables used in the state and trait anxiety scales.

Nutrition is considerably important in the fight against COVID-19, as it is in many diseases. Many institutions and organizations published nutritional recommendations to strengthen the immune system against COVID-19.<sup>25</sup> Specific nutritional risk screening tools have not been widely used in clinical practice to identify patients with COVID-19 having a higher risk of malnutrition. The application of nutritional risk screening tools is an important part of the nutritional assessment of patients

with severe COVID-19 and the first step in nutritional support therapy.<sup>26</sup> In a study conducted in Italy, individuals have increased consumption of homemade desserts, pizza, bread, cereals, white meat, and hot drinks during the pandemic and decreased consumption of fresh fish, packaged confectionery, and alcohol.<sup>27</sup> In a study conducted in China by Zhao *et al.*<sup>28</sup> 31.2% of the participants stated that they used vitamin C, probiotics, and other nutritional supplements during the pandemic.

In our study, 64.8% of the participants used herbal products or supplements to strengthen their immune systems, and 35.2% did not use such products. In their study, Liu *et al.*<sup>29</sup> applied an individualized multidisciplinary approach plan according to the condition of each patient receiving COVID-19 treatment, including antiviral treatment, active infection control, immune support, psychological counseling, and phytotherapy support. The psychological situation during the pandemic and its restrictions greatly affected the nutritional habits of individuals and caused a decrease in their physical activities, leading to deterioration in body functions, fear, and abstinence from physical activities.<sup>30</sup> In the present study, only 5.6% of the participants performed physical activity regularly, whereas 75.9% did not have regular physical activity. Low levels of physical activity during the disease course were reported by Tavakol *et al.*<sup>31</sup> in 206 COVID-19 cases. Many factors were

identified to cause weight loss in patients with COVID-19, such as loss of appetite, loss of taste, fever, inflammation, inactivity, malnutrition, and endocrine dysfunction.<sup>32</sup> In the present study, bodyweight decreased in 47.2% of the participants, whereas it remained unchanged in 43.5%. Only 9.3% stated that they gained weight during the disease period. In the study by Haraj *et al.*<sup>33</sup> weight loss was reported in 61% of their patients with COVID-19, while 39% stated no change in bodyweight. Various drugs, which lacked evidence of their efficiency, have been used in the treatment of COVID-19 worldwide, and they are expected to be beneficial because they manifest effectiveness in other indications or because of the results of *in vitro* studies. In the present study, 41.7% of the participants used the drugs given by the Ministry of Health during the illness, while 58.3% did not use these drugs. Moreover, 96.3% were not hospitalized during the disease period, while 3.7% were hospitalized. The higher proportion of patients who did not use drugs than those who used drug supplements was attributed to infollution in social media and social environments of the patients about the side effects of drugs. In the present study, majority of the participants did not require hospitalization, so they stayed at home during the disease period.

State anxiety is defined as “a form of anxiety that arises due to environment-related stress, usually due to logical reasons, and explicable for others, and generally depends on the temporary situation experienced by each individual.”<sup>34</sup> Trait anxiety, however, is defined as “evaluating a stressful situation as dangerous or threatening, and increasing and perpetuating the frequency and intensity of state anxiety and emotional reactions toward these threats and becoming continuous.” The state anxiety level increases with intensive stress and decreases when stress disappears.<sup>35</sup> In the present study, a strong, positive, and significant relationship was found between the state anxiety level and trait anxiety level. A significant difference was found between gender distributions and trait anxiety level, in favor of male participants. By contrast, significant differences were found between the diagnosis of COVID-19 (by a health personnel or not) and the state and trait anxiety levels. In the review of relevant studies, the state and/or trait anxiety scores of women were generally higher than those of men.<sup>36</sup> In a study of healthcare workers during the COVID-19 pandemic, the mean state anxiety levels of women were significantly higher different from those of men. The mean trait anxiety level was not different with regard to gender.<sup>37</sup>

In the present study, no significant difference was found between the state anxiety scores of men and women with COVID-19. However, the mean trait anxiety level was significantly higher in women than in men. People experience high levels of anxiety during viral epidemic or pandemic, leading to alterations in various behavioral

patterns, including various habits, with regard to gender. Adaptive response mechanisms to the environmental challenges differ between men and women of various age groups.<sup>38,39</sup> Although many studies have been conducted on the COVID-19 pandemic, various aspects are still unknown. Nutrition and the use of nutritional supplements became popular topics since the beginning of the epidemic in Turkey and worldwide. To date, available data show that advanced age, male gender, poor eating habits, and accompanying diseases are important risk factors for the poor prognosis of COVID-19. Social isolation is unavoidable in the fight against COVID-19, along with staying at home in confinement. Thus, reduced level of physical activity would not be surprising worldwide. In the present study, the majority of the participants used nutritional supplements and significantly reduced their physical activity levels. However, when the state and trait anxiety levels of the participants were evaluated according to gender, women displayed higher levels of anxiety. In addition, changes were observed in the nutritional status of the participants. A significant relationship was found between the changes in eating habits during the disease course and anxiety levels of the participants.

## CONCLUSIONS

COVID-19 has affected thousands of people, and those who recovered from it still experience and continue to struggle with symptoms even several months after the recovery. Symptoms such as fatigue, weakness, pains, and malnutrition may occur even after the illness is over. In addition, COVID-19 survivors may be concerned about getting the virus again. Among the study limitations, this study has a small sample size and limited area of research. Further comprehensive studies involving more people living in different regions are warranted.

## CONFLICT OF INTEREST

None declared.

## FUNDING

None declared.

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