Original Research

The Effect of the Covid-19 Pandemic on Nutritional Status and Anxiety Levels in Turkish Young Adults

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Abstract

Background

The pandemic called "Coronavirus Disease 2019" (COVID-19), which first appeared in China, then spread to the whole world, has had negative consequences in many areas, especially in health. The long-term quarantine process caused by the pandemic and the experienced stress had a great impact on nutritional habits.

Aim

In this study, it was aimed to determine the change in anxiety levels and eating habits of young adults after the COVID-19 pandemic.

Methods

The data were obtained through an online questionnaire between April and July 2020. In the questionnaire, the general and health information of the individuals, their nutritional habits, and anthropometric measurements (height and body weight) were questioned. In addition, the food frequency questionnaire form and Beck Anxiety Inventory were applied.

Results

A total of 823 (174 males and 649 females) participants were included in the study. The median ages of males and females were 27.0 (18.0) and 26.0 (8.0), respectively. According to the results of the food frequency questionnaire; it was found that among females, the consumption of egg, cheese, milk, yogurt, pickles, fruit, onion, garlic, lemon, salad, legumes, pastry, sweets, red meat, turmeric, and herbal tea were increased significantly in the post-pandemic period; and the consumption of milk, yogurt, garlic, and lemon significantly increased in males. It was also found that the anxiety levels of the females increased statistically significantly in the post-pandemic period.

Conclusion

It was determined that during the COVID-19 pandemic, there were statistically significant changes in the food intake patterns and anxiety levels of the participants. It is thought that the results obtained from this study may be a guide for further studies to determine the nutritional habits in the COVID-19 pandemic.

Keywords: Coronavirus; pandemics; eating; food; anxiety.

Introduction

Several local health facilities reported clusters of patients with pneumonia of unknown cause that was epidemiologically linked to seafood and wet animal wholesale market in Wuhan, Hubei Province, China on December 31, 2019. As a result of the examinations, the source of pneumonia was determined, and a new coronavirus called "Coronavirus Disease 2019" (COVID-19) was isolated[1,2].

The frequent clinical features of COVID-19 include dry cough, fever, diarrhea, vomiting, myalgia, and impaired sense of taste and smell. Individuals with multiple comorbidities are prone to severe infection and may also present with acute kidney injury and features of ARDS[3,4]. At the same time, the psychological effects of COVID-19 should not be ignored. Significant symptoms of impulsivity, insomnia, depression, anxiety, and post-traumatic stress disorder can be seen in COVID-19 patients[5]. For COVID-19, which also has a fetal course[6], a total of 192.284.207 cases and 4.136.518 deaths have been reported worldwide as of July 26, 2021[7].

Most treatments are currently symptomatic and supportive, though anti-inflammatory and antiviral treatments have been employed. For complicated patients, continuous renal replacement therapy, invasive mechanical ventilation, and even extracorporeal membrane oxygenation have been included in the supportive treatment. No specific antiviral drugs have been confirmed effective. Several efforts to develop vaccines are underway, but the World Health Organization (WHO) estimates it will take 18 months for the COVID-19 vaccines to be available[8].

While all this is happening, COVID-19, which affects the whole world, brings along some health problems besides being infected. As a result of a multi-national study, the psychological effects of the pandemic were examined and it was determined that Poland and the Philippines were the two countries with the highest levels of anxiety, depression, and stress, while Vietnam had the lowest average scores in these areas[9]. As a result of a study covering 7 middle-income countries in Asia, it was stated that Thailand had the highest scores and Vietnam had the lowest anxiety, depression, and stress scores[10]. At this point, the policies followed by governments can also be important. As a result of a meta-analysis and systematic review, it was stated that governments taking strict measures to contain the spread of COVID-19

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are beneficial not only for physical health but also for mental health. It has been shown that the prevalence of clinically significant depressive symptoms is significantly lower in countries where governments immediately implemented the strongest policies. Because a swift and stringent government response may reduce stress by increasing certainty and resilience against uncertainty[11]. Fear and anxiety experienced by individuals cause changes in diet models. In a study, it has been shown that eating habits are affected by stress, distress, and anger, and therefore a high level of distress is associated with an unhealthy diet and poor diet quality[12]. In addition to this, at the individual level, the common denominator that drives most of the nutrition and dietary recommendations to combat viral infections, including COVID-19, lies within the link between diet and immunity. Because nutritional deficiencies of energy, protein, and specific micronutrients are associated with poor immune function and increased susceptibility to infection, in this period, individuals are advised to avoid snacks and prefer fruits, vegetables, nuts, and dairy products that are rich in micronutrients[13].

The importance of nutrition for this pandemic that affects the whole world is quite clear[14]. Therefore, it is emphasized that a healthy diet and living are vital[15]. From this point of view, it is expected that individuals' eating habits will change depending on various factors in the COVID-19 pandemic process, and it was aimed to determine the nutritional habits of individuals after the COVID-19 pandemic in this study.

Methods

This cross-sectional study was carried out on 823 adults (174 males and 649 females) between April and July 2020. For the study, "Ethical Commission Approval" numbered 13/178 has been obtained from Suleyman Demirel University Ethics Commission. Individuals were informed about the study, and those who agreed to participate voluntarily were included in the study.

To evaluate the changes in nutritional habits of individuals during the COVID-19 pandemic, an online questionnaire form created over Google was applied to individuals, and the questionnaire forms were collected electronically in this study. Before starting the survey, informed consent was obtained from all subjects involved in the study. Afterwards the questionnaire form was displayed on the screens of the participants who stated that they participated in the study voluntarily.

Data Collection Technique and Tool

In the questionnaire, the general and health information of individuals, their nutritional habits, and anthropometric measurements (height and body weight) were questioned. In addition, the food frequency questionnaire form and Beck Anxiety Inventory were used.

Content of the Survey Form

In the questionnaire, the age, gender, educational status, and occupation of the individuals were questioned within the general information, while the presence of chronic diseases and drug use status were questioned for health information. To determine their nutritional habits, the participants were asked various questions such as the number of meals, bread making at home, the type of flour used in bread making, homemade yogurt, and the type of yeast used in making yogurt. At the same time, information was obtained about the use of nutritional supplements such as probiotics, propolis, cumin extract, beta-glucan, and vitamin C pre and post COVID-19 pandemic. However, bodyweight changes during the COVID-19 pandemic were questioned by obtaining the individuals' height (cm) and body weight (kg) information.

Food Frequency Questionnaire

The food frequency questionnaire form, in which various foods are questioned to determine the changing food consumption of individuals, is presented separately for pre and post COVID-19 pandemic. Since the food frequency questionnaire can be changed according to the purpose and can be created by considering food groups or basic nutrients, the form in this study was also prepared by the researchers.16 In addition to the bread and cereal group, dairy group, meat group, and fruit and vegetable group, groups such as packaged products and desserts were also questioned in this food frequency questionnaire. It was requested to choose one of the "every day", "3-5 times a week", "1-2 times a week" and "1/none per month" options for the consumption frequency of these foods. The consumptions of individuals were grouped as follows; high consumption (every day and 3-5 times a week), modest consumption (1-2 times a week), and low/no consumption (1/none per month).

Beck Anxiety Scale

The Beck Anxiety Scale was used to determine the anxiety situation of those whose risk increased with the epidemic and to examine its effect on nutritional status. This scale was questioned for two separate periods considering the last weeks before and after the COVID-19 pandemic period. Beck Anxiety Scale is a self-report scale developed to measure the severity of anxiety symptoms in 1988 by Beck et al.[17]. Its Turkish validity and reliability study was conducted in 1998 by Ulusoy et al.[18]. The BAI showed a high internal consistency (alpha = 0.93). The item-total correlations ranged from 0.45 to 0.72[18]. This scale is a Likert-type scale consisting of 21 questions that can be applied to all healthy adolescents and adults, each scored between 0 and 3. When marking symptoms on the scale, 0 means "absent", 1 "mild", 2 "moderate" and 3 "severe". The total score range is 0-63, and the higher the total score, the higher the level of anxiety experienced by the individual. According to this, 0-15 is evaluated as "no anxiety", 16-22 "mild anxiety", 23-42 "anxiety", 43-63 "intense anxiety".

Statistical Evaluation

SPSS 23.0 program was used to evaluate the data obtained. Qualitative variables are expressed as number (S) and percentage (%), while quantitative variables are expressed as median, Interquartile range (IQR), and min-max. From the answers they gave to the questionnaire for each participant, it was tested with the Kolmogorov-Smirnov method as the number of samples was larger than 30 and it was determined that our data did not show normal distribution. For this reason, the Mann Whitney U test was used for the two-category variables in our dataset. The Chi-square test was used in the analysis of categorical data. McNemar-Bowker Test was used to test the relationship between more than two categorical dependent variables. In all analyzes, $p<0.05$ was considered as statistically significant difference.

Table 1. General characteristics of the participants[1].

	Females (n=649)		Males (n=174)		p
	Median;IQR(min-max)	n (%)	Median;IQR(min-max)	n (%)	
Age (years)	26.0;8.0 (18.0-66.0)		27.0;18.0 (18.0-62.0)		<0.001*
Current Body Weight (kg)	60.0;15.0 (40.0-125.0)		80.0;18.0 (55.0-120.0)		<0.001*
Pre-Pandemic Weight (kg)	60.0;14.0 (40.0-120.0)		81.0;19.0 (54.0-120.0)		<0.001*
Height (m)	163.0;8.0 (156.0-185.0)		178.0;10.0 (160.0-200.0)		<0.001*
Current BMI (kg/m^2)	22.6;5.1 (16.2-40.8)		25.7;4.8 (17.6-39.2)		<0.001*
Pre-pandemic BMI (kg/m^2)	22.5;5.1 (15.9-40.8)		25.7;4.5 (17.6-39.2)		<0.001*
Education Status					
Primary school		9 (1.4)		-	
Middle School		15 (2.3)		4 (2.3)	
High school		70 (10.8)		22 (12.6)	0.659
Undergraduate		37 (5.7)		8 (4.6)	
License		421 (64.9)		112 (64.4)	
Postgraduate		97 (14.9)		28 (16.1)	
Working Status					
Working		276 (42.5)		112 (64.4)	<0.001*
Not working		373 (57.5)		62 (35.6)	
Profession					
Public		81 (43.3)		66 (37.9)	
Student		193 (29.7)		45 (25.9)	
Retired		5 (0.8)		2 (1.1)	<0.001*
Housewife		58 (8.9)		-	
Private sector		97 (14.9)		56 (32.2)	
Not working		15 (2.3)		5 (2.9)	
Disease Presence					
No Disease		499 (76.9)		145 (83.3)	
Cardiovascular Diseases		8 (1.2)		4 (2.3)	
Respiratory Diseases		24 (3.7)		6 (3.4)	
Digestive System Diseases		9 (1.4)		1 (0.6)	
Thyroid Disesase		32 (4.9)		2 (1.1)	
Migraine		13 (2.0)		1 (0.6)	
Allergy		7 (1.1)		1 (0.6)	0.298
Eye diseases		1 (0.2)		-	
Psychiatric Diseases		4 (0.6)		2 (1.1)	
Hypertension		9 (1.4)		3 (1.7)	
Diabetes Mellitus		7 (1.1)		1 (0.6)	
Thalassemia		7 (1.1)		-	
Joint Diseases		8 (1.2)		2 (1.1)	
Other		21 (3.2)		5 (2.9)	

*Data are given as a percentage. *Mann Whitney U Test and Chi-Square Test p<0,05.*

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Table 2. Changes in eating habits in male and female participants due to the pandemic[2].

	Females (n=649)		Males (n=174)		p
	Median;IQR(min-max)	n (%)	Median;IQR(min-max)	n (%)	
Pre-pandemic snack consumption	2.0;1.0 (0-3)		1.0;1.0 (0-5)		0.004*
Post-pandemic snack consumption	2.0;2.0 (0-6)		1.0;1.0 (0-7)		0.275
Pre-pandemic main meal consumption	3.0;1.0 (0-6)		3.0;1.0 (1-4)		0.973
Post-pandemic main meal consumption	2.0;1.0 (0-6)		2.0;1.0 (0-4)		0.082
Starting to make bread at home post-pandemic					
Yes		197 (30.4)		45 (25.9)	0.498
No		413 (63.6)		117 (67.2)	
Doing it before		39 (6.0)		12 (6.9)	
Using sourdough for bread making post-pandemic					
Yes		77 (11.9)		23 (13.2)	0.472
No		162 (25.0)		42 (24.1)	
Using before		51 (7.9)		9 (5.2)	
Using other flour instead of white flour in read making post-pandemic					
Yes		48 (7.4)		16 (9.2)	0.213
No		426 (65.6)		122 (70.1)	
Using before		175 (27.0)		36 (20.7)	
Type of flour used*					
White flour		200 (30.9)		52 (29.9)	
Whole wheat flour		119 (18.3)		26 (14.9)	
Rye flour		6 (0.9)		3 (1.7)	
Siyez Flour		25 (3.9)		4 (2.3)	
Bran flour		21 (3.2)		3 (1.7)	
Oat flour		2 (0.3)		1 (0.6)	

[2] Mann Whitney U Test, p<0,05. **More than one option was marked in the questionnaire form.*

Results

Sample Characteristics

The total number of participants who completed the questionnaire was 823 (174 males (21.14%) and 649 females (78.86%). The median ages of males and females were 27.0 (18.0) and 26.0 (8.0) years, respectively. The median value of current BMI is 25.7 (4.8) and 22.6 (5.1) kg/m2; the median value of pre-pandemic BMI was 25.7 (4.5) and 22.5 (5.1) kg/m2 for males and females, respectively ($p<0.05$). Most of the females (64.9%) and males (64.4%) had license education status. However, most of the females (57.5%) weren't working whereas most of the males (64.4%) were working. It has been found that the 43.3% of the females and the 37.9% of the males were working in a public institution. When the disease status of the participants was examined, it was seen that 76.9% of females and 83.3% of males did not have any disease. The most common disease was thyroid diseases (4.9%) in females and respiratory diseases (3.4%) in males. It has been reported that the 79.8% of females and the 89.1% of males do not use drugs regularly, 1.2% of females who use drugs increased the drug dose, and 1.1% of males decreased the drug dose in the post-pandemic period. While 86.6% of females and 67.8% of males did not smoke, both females and males who smoke have increased the number of cigarettes in the post-pandemic period. Table 1 shows the characteristics of the participants at baseline.

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Table 3. Consumption of food groups pre- and post-pandemic[3]

Food Group Consumption	Females (n=649)			Males (n=174)		
	Pre-Pandemic	Post-Pandemic	p	Pre-Pandemic	Post-Pandemic	p
Egg						
High	203 (31.3%)	283 (43.6%)	<0.001*	70 (40.2%)	77 (44.3%)	0.282
Modest	407 (62.7%)	335 (51.6%)		96 (55.2%)	88 (50.6%)	
Low/No	39 (6.0%)	31 (4.8%)		8 (4.6%)	9 (5.2%)	
Cheese						
High	422 (65.0%)	471 (72.6%)	<0.001*	100 (57.5%)	102 (58.6%)	0.773
Modest	214 (33.0%)	163 (25.1%)		66 (37.9%)	65 (37.4%)	
Low/No	13 (2.0%)	15 (2.3%)		8 (4.6%)	7 (4.0%)	
Milk						
High	110 (16.9%)	143 (22.0%)	<0.001*	30 (17.2%)	35 (20.1%)	0.001*
Modest	416 (64.1%)	411 (63.3%)		92 (52.9%)	103 (59.2%)	
Low/No	123 (19.0%)	95 (14.6%)		52 (29.9%)	36 (20.7%)	
Yogurt						
High	199 (30.7%)	252 (38.8%)	<0.001*	53 (30.5%)	63 (36.2%)	0.014*
Modest	433 (66.7%)	387 (59.6%)		113 (64.9%)	107 (61.5%)	
Low/No	17 (2.6%)	10 (1.5%)		8 (4.6%)	4 (2.3%)	
Kefir						
High	14 (2.2%)	16 (2.5%)	0.251	5 (2.9%)	4 (2.3%)	0.659
Modest	216 (33.3%)	228 (35.1%)		49 (28.1%)	53 (30.5%)	
Low/No	419 (64.6%)	405 (62.4%)		120 (69.0%)	117 (67.2%)	
Pickle						
High	36 (5.5%)	48 (7.4%)	0.035*	12 (6.9%)	7 (4.0%)	0.274
Modest	398 (61.3%)	406 (62.1%)		107 (61.5%)	113 (64.9%)	
Low/No	215 (33.1%)	198 (30.5%)		55 (31.6%)	54 (31.0%)	
Fruit						
High	270 (41.6%)	319 (49.2%)	<0.001*	59 (33.9%)	61 (35.1%)	0.392
Modest	359 (55.3%)	310 (47.8%)		109 (62.6%)	108 (62.1%)	
Low/No	20 (3.1%)	20 (3.1%)		6 (3.4%)	5 (2.9%)	
Vegetables						
High	138 (21.3%)	148 (22.8%)	0.120	30 (17.2%)	26 (14.9%)	0.442
Modest	492 (75.8%)	491 (75.7%)		137 (78.7%)	139 (79.9%)	
Low/No	19 (2.9%)	10 (1.5%)		7 (4.0%)	9 (5.2%)	
Onion						
High	255 (39.3%)	297 (45.8%)	<0.001*	37 (21.3%)	45 (25.9%)	0.183
Modest	346 (53.3%)	328 (50.5%)		127 (73.0%)	119 (68.4%)	
Low/No	48 (7.4%)	24 (3.7%)		10 (5.7%)	10 (5.7%)	

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Table 3 Cont...

Garlic						
High	133 (20.5%)	176 (27.1%)	<0.001*	19 (10.9%)	25 (14.4%)	0.037*
Modest	421 (64.9%)	415 (93.9%)		127 (73.0%)	127 (73.0%)	
Low/No	95 (14.6%)	58 (8.9%)		28 (16.1%)	22 (12.6%)	
Lemon						
High	225 (34.7%)	268 (41.3%)	<0.001*	34 (19.5%)	49 (28.2%)	0.012*
Modest	396 (61.0%)	365 (56.2%)		128 (73.6%)	113 (64.9%)	
Low/No	28 (4.3%)	16 (2.5%)		12 (6.9%)	12 (6.9%)	
Salad						
High	261 (40.2%)	315 (48.5%)	<0.001*	48 (27.6%)	51 (29.3%)	0.120
Modest	373 (57.5%)	326 (50.2%)		118 (67.8%)	116 (66.7%)	
Low/No	15 (2.3%)	8 (1.2%)		8 (4.6%)	7 (4.0%)	
Legumes						
High	25 (3.9%)	43 (6.6%)	<0.001*	14 (8.0%)	14 (8.0%)	0.905
Modest	581 (89.5%)	580 (89.4%)		152 (87.4%)	151 (86.8%)	
Low/No	43 (6.6%)	26 (4.0%)		8 (4.6%)	9 (5.2%)	
Pastry						
High	27 (4.2%)	53 (8.2%)	<0.001*	16 (9.2%)	22 (12.6%)	0.185
Modest	521 (80.3%)	532 (82.0%)		140 (80.5%)	134 (77.0%)	
Low/No	101 (15.6%)	64 (9.9%)		18 (10.3%)	18 (10.3%)	
Bread						
High	437 (67.3%)	456 (70.3%)	0.159	127 (73.0%)	123 (70.7%)	0.607
Modest	193 (29.7%)	175 (27.0%)		42 (24.1%)	47 (27.0%)	
Low/No	19 (2.9%)	18 (2.8%)		5 (2.9%)	4 (2.3%)	
Dessert						
High	71 (10.9%)	109 (16.8%)	<0.001*	27 (15.5%)	22 (12.6%)	0.108
Modest	517 (79.7%)	493 (76.0%)		130 (74.7%)	131 (75.3%)	
Low/No	61 (9.4%)	47 (7.2%)		17 (9.8%)	21 (12.1%)	
Junk food						
High	95 (14.6%)	108 (16.6%)	0.327	37 (21.3%)	43 (24.7%)	0.086
Modest	411 (63.3%)	408 (62.9%)		110 (63.2%)	95 (54.6%)	
Low/No	143 (22.0%)	133 (20.5%)		27 (15.5%)	36 (20.7%)	
Red Meat						
High	21 (3.2%)	34 (5.2%)	0.008*	12 (6.9%)	13 (7.5%)	0.741
Modest	579 (89.2%)	578 (89.1%)		151 (86.8%)	148 (85.1%)	
Low/No	49 (7.9%)	37 (5.7%)		11 (6.3%)	13 (7.5%)	

[3]*McNamer-Bowker Test, p<0,05

Table 4. Anxiety level of participant pre- and post-pandemic[4]

	Females (n=649)			Males (n=174)		
	Pre-Pandemic	Post-Pandemic	p	Pre-Pandemic	Post-Pandemic	p
Anxiety Level						
No anxiety	524 (80.7%)	486 (74.9%)		156 (89.7%)	151 (86.8%)	
Mild anxiety	70 (10.8%)	88 (13.6%)	0.001*	10 (5.7%)	18 (10.3%)	0.080
Anxiety	46 (7.1%)	58 (8.9%)		7 (4.0%)	5 (2.9%)	
Intense anxiety	9 (1.4%)	17 (2.6%)		1 (0.6%)	-	

[4]*McNamer-Bowker Test, p<0,05

Nutritional Habits

In this study, the change in eating habits of males and females in the post-pandemic period were investigated. It was observed that 30.4% of the females and the 25.9% of the males started to make their bread at home in the post-pandemic period. Furthermore, it was found that 11.9% of the females and 13.2% of males started to use sourdough in bread making in the post-pandemic period; 7.4% of females and 9.2% of males used functional flour instead of white flour, considering its beneficial effect. It was observed that whole wheat flour was the most preferred flour after white flour in both females and males.

It was observed that 10.8% of the females and 9.8% of the males started to make their yogurt at home in the post-pandemic period. In addition, it was found that 3.1% of females and 5.2% of males started to use probiotic yeast in making yogurt in the post-pandemic. Food groups whose consumption was increased considering the beneficial effects in the post-pandemic have been researched, and the food groups whose consumption increased the most in females are fruits (14.3%), ginger/turmeric (7.9%), and vinegar (7.4%); in males, fruit (17.8%), ginger/turmeric (8.6%), and vinegar (8.0%) were found. Also, in the post-pandemic period, females started to use vitamin C (12.3%), vitamin D (11.6%) and propolis (4.9%) supplements, while males started to use vitamin C (9.8%), vitamin D (6.3%), and multivitamin (5.1%) (Table 2).

According to the results of the food frequency questionnaire; it was found that the consumption of egg, cheese, milk, yogurt, pickles, fruit, onion, garlic, lemon, salad, legumes, pastry, sweets, red meat, turmeric, and herbal tea increased significantly in the post-pandemic period among females; the consumption of milk, yogurt, garlic, and lemon significantly increased in males (Table 3).

Emotional Changes

The change in the anxiety levels of the participants in the post-pandemic period was examined, and it was found that the anxiety levels of the females increased significantly. While mild anxiety was seen in 10.8% in the pre-pandemic period, it was seen in 13.6% of the females in the post-pandemic period (Table 4).

Discussion

Coronavirus has struck concern into populations throughout the world and horrified the global medical community[19]. In the world and Turkey, very vigorous and staggering changes happened in the lifestyles, nutritional habits, education, economy, and politics because of the rapid spread of the pandemic which is called COVID-19[20]. The most important impact of the COVID-19 was on nutritional habits. Renzo et al.[21] reported in an Italian survey, the increase of homemade recipes (e.g. sweets, pizza, and bread), cereals, legumes, white meat, and hot beverages consumption, and a decrease of fresh fish, packaging sweets, and baked products, delivery food and alcoholics intake during COVID 19 emergency. Also, during the COVID-19 quarantine, more than 37.4% of the participants reported consuming unhealthy foods (fruit, vegetables, nuts, and legumes)21. Sidor and Rzymski[22] reported that 43.5% of the participants declared eating more during COVID-19 quarantine, and 51.8% consumed snacks more frequently in Poland. During the quarantine in Poland, about one-third of those participants did not consume fresh vegetables and fruits daily, while the same proportion to accepted consuming sweets at least every day[22]. Scarmozzino and Visioli[23] reported in an Italian sample that 49.6% of the participants did not essentially modify their diet during the quarantine; however, 52.9% of them declared that they were eating more during the quarantine, and 19.5% gained weight. Especially, they declared an increase in "comfort food" consumption, notably chocolate, ice cream, desserts (42.5%), and salty snacks (23.5%). Additionally, 21.2% of participants increased their consumption of fresh fruit and vegetables[23]. In this study, it was found that the consumption of egg, cheese, milk, yogurt, pickles, fruit, onion, garlic, lemon, salad, legumes, pastry, sweets, red meat, turmeric, and herbal tea increased significantly in the post-pandemic period among females; the consumption of milk, yogurt, garlic, and lemon significantly increased in males. Gender-related preference differences may also have been effective in the change in these dietary habits. It is thought that the fact that males were much less than females in this study may have affected the results. In this regard, in a very recent study, it was emphasized that males' desire to consume meat and females' desire to consume sweets were more[24].

In this study, it was observed that the participants began or increased the consumption of some nutrients and dietary supplements thinking that they would protect them from COVID-19. Food groups whose consumption is increased considering the beneficial effects post-pandemic have been researched and the food groups whose consumption is mostly increased in females are fruits (14.3%), ginger/turmeric (7.9%) and vinegar (7.4%); in males, fruit (17.8%), ginger/turmeric (8.6%) and vinegar (8.0%) were found. Since food consumption frequency questionnaires can be created by researchers specifically for the purpose, the results obtained here cannot be directly compared with the results obtained from food consumption frequency questionnaires used in other studies, a limitation occurs. Garipoğlu and Bozar[25] reported that 68.9% of the participants believed

that foods could be beneficial in protecting against the pandemic COVID 19, and these foods were mostly garlic (76.1%), ginger (53.1%), kefir (42%), and vinegar (41.2%). Also, they reported that the most commonly used nutritional supplements were vitamin C (19.6%), vitamin D (15.6%), multivitamin (13.9%), probiotic-prebiotic (10.5%), fish oil (7.4%)[25]. It is reported that vitamin C is a well-known anti-viral, especially for influenza virus[26]. It is also emphasized that vitamin C can play an auxiliary role in the treatment of various viral infections. It has been reported that patients with life-threatening respiratory failure due to influenza A infection were treated with hydrocortisone, vitamin C, and thiamine (without corticosteroids), and consequently, a rapid improvement was observed in these patients[27]. It is suggested that vitamin C may alleviate or prevent infections caused by bacteria, viruses, and protozoa. In addition, it has been determined that regularly administered vitamin C shortens the duration of the common cold[28]. However, the effect of vitamin C on viral infections is not clear. It is also emphasized that high-dose intravenous vitamin C administration in the treatment of COVID-19 may have a pro-oxidant effect rather than its antioxidant effect, depending on the dose[29]. Similarly, vitamin D is known to act as an important regulator of the immune system and induce immune responses to viral infections. It has been reported that vitamin D deficiency can create a risk for influenza and respiratory system infections[30]. It is suggested that this effect of vitamin D occurs because of its immunoregulatory properties, its interaction with cellular and viral factors, induction of autophagy and apoptosis, and genetic and epigenetic changes[31]. Propolis is also a product widely used in traditional medicine due to its anti-viral and anti-bacterial effects[32]. It is suggested that the use of propolis together with IFN-α inhalation, ribavirin, chloroquine phosphate, and arbidol in the treatment of COVID-19 can create a promising synergistic effect[33]. In this study, in the post-pandemic period, females started to use vitamin C (12.3%), vitamin D (11.6%), and propolis (4.9%) supplements, while males started to use vitamin C (9.8%), vitamin D (6.3%), and multivitamin (5.1%). These findings show that the participants chose the supplements they started to use during this pandemic period, considering their anti-viral effects.

Adequate and balanced nutrition with appropriate energy, vitamin, and mineral are very important in maintaining a healthy continuity of the immune system. For this reason, the nutritional status of each COVID-19 patient should be evaluated before starting treatment. It is suggested that nutritional support should form the basis of the treatment of any infected individual[34]. It is emphasized that the increased consumption of diets rich in saturated fat, sugar, and refined carbohydrates (western diet) worldwide can contribute to the prevalence of obesity and type II diabetes, thereby increasing the COVID-19 mortality rate. It has been reported that Western diets impair adaptive immunity and lead to impaired host defense against chronic inflammation and viruses. It is also reported that this kind of diet worsens the peripheral inflammation caused by COVID-19 infection and may lead to chronic diseases such as neurodegenerative diseases[35]. It is suggested that the Mediterranean diet, which has limited consumption of processed food and high consumption of fruits and vegetables, is important in the management of COVID-19. Various foods associated with the Mediterranean diet and other healthy eating patterns are known to contain bioactive phenolic compounds, polar lipids, and peptides with powerful anti-inflammatory, antithrombotic, and antioxidant properties[15].

This pandemic can cause psychological effects on people by laying fear due to both the uncertainty of the disease and the quarantine. These psychological effects are; post-traumatic stress disorder, depression, anxiety, panic disorders, and behavioral disorders[36]. Choi et al.37 reported of the 500 participants, 19% had depression and 14% had anxiety. Also, 25.4% declared that their mental health got worse because of the COVID-19 pandemic[37]. Özdin and Bayrak Özdin38 reported in a Turkish survey 23.6% of the participants had depression, and 45.1% had anxiety. In addition, they reported that females were most psychologically affected by the COVID-19 pandemic[38]. In this study, the change in the anxiety levels of the participants in the post-pandemic period was examined, and it was found that the anxiety levels of the females increased statistically significantly. While mild anxiety was seen in 10.8% of females in the pre-pandemic period, it started to be seen in 13.6% in the post-pandemic period. Therefore, our findings are consistent with other studies in the literature.

Internet-delivered cognitive behavior therapy (iCBT), which is expressed as the internet over the presentation of cognitive behavior therapy (CBT), one of the most widely researched and proven evidence-based treatments for psychological disorders, has developed in parallel with the latest technological developments. By using the iCBT service, individuals can enjoy the benefits of cognitive behavior therapy flexibly, with or without support. ICBT interventions have become a method for popularizing evidence-based treatments for a wide variety of psychological disorders, including depression and anxiety. Also, iCBT is used to prevent psychological impairment associated with the management of long-term conditions in individuals with diabetes, coronary artery disease, and chronic pain[39]. This therapy will also be useful to promote mental wellness and provide psychological intervention during the COVID-19 pandemic[40]. Individually tailored iCBT is seen as a way to reduce psychological problems associated with the COVID-19 pandemic. In a related pilot study, it was determined that iCBT treatment provided moderate or high reductions in depression, anxiety, and stress symptoms[41]. However, it is known that the cost of such internet-based applications is high. Moodle, a commonly known o open-source learning platform, can be a cost-effective solution for practicing and delivering such therapies[42].

Conclusion

This pandemic has caused many changes in human life. One of these important changes is on the nutritional habits. In conclusion, the consumption of egg, cheese, milk, yogurt, pickles, fruit, onion, garlic, lemon, salad, legumes, pastry, sweets, red meat, turmeric, and herbal tea increased significantly in the post-pandemic period among females; the consumption of milk, yogurt, garlic, and lemon significantly increased in males. At the same time, some of the participants started to make their own bread and yogurt after the pandemic, and there was an increase in the use of some nutritional supplements. It is thought that the participants applied these changes to be healthier during the pandemic. Also, it was found that the anxiety levels of the females increased significantly in the post-pandemic period. It is thought that the results of this study will provide data in determining the nutritional orientation of people in the

COVID-19 pandemic and will lay the groundwork for an intervention-based study. Our study is among the first studies on this subject. For this reason, it contributes to the literature.

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Author Disclosure

The authors declare that there are no conflicts of interest.

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