Nutritional habits and emotional eating of adults during social isolation days due to Covid-19 pandemic

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A- Conception and study design; **B** - Collection of data; **C** - Data analysis; **D** - Writing the paper;
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ABSTRACT

Purpose: In this study, the effect of BMI values on eating habits and emotional eating of individuals in social isolation and quarantine process implemented in Turkey as a result of COVID-19 pandemic were investigated.

Materials and methods: An online questionnaire was used in this cross-sectional study. A total of 2019 participants were included in the study between April and May 2020. Individuals' nutritional behaviors, emotional eating scores using the three-factor eating questionnaire stress level, appetite status, desire to eat desserts and anxiety about food access using a visual analog scale were evaluated with the questionnaire.

Results: The study participated 1589 women and 430 men over the ages of 20. The obesity rate was 8.7% in women and 19.3% in men. There was a relationship between the stress score and the change in consumed food in women and in men. Involuntary weight changes were found significant in both men and women compared to BMI groups. Cereal and starchy food consumption were found to be related to BMI groups in men and women. It was determined that the average appetite levels and Emotional Eating Scale scores in both sexes were different between BMI groups.

Conclusions: The findings show that the participants' eating habits have changed in quarantine-related social isolation. Emotional eating has increased in direct proportion with BMI, and involuntary weight gain has increased.

Keywords: COVID-19, social isolation, nutritional habits, emotional eating, nutrition

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INTRODUCTION

SARS-CoV-2 infection, which first appeared in China [1], continues to spread in our country and in many other countries as well [2]. Quarantine and social isolation practices, which are among the measures taken to reduce infection transmission, can lead to changes in individuals' food consumption behavior. Social isolation can affect mental and physical health and food consumption, and nutritional status. It causes different nutritional conditions in different age groups in society. It is well known that social isolation results in malnutrition in the elderly [3]. On the other hand, it is reported that social isolation in the younger population and especially in women is associated with an increase in BMI [4].

This period can lead to the increased stress that the risk of emotional eating, obesity, insulin resistance, and metabolic syndrome [5]. It has been reported that obese individuals have more severe complications related to COVID-19, and high body mass index, high visceral adipose tissue, and high waist circumference are risk factors for COVID-19 infection [6].

This study aimed to evaluate the effect of BMI values on the nutritional habits and emotional eating situations of individuals in quarantine.

MATERIALS AND METHODS

Study Design and Participants

This cross-sectional descriptive study has been carried out in Turkey between April-May 2020 among individuals over the age of 20 who agreed to participate voluntarily in an online survey without a sample selection method. Exclusion criteria were determined as under 20 years of age and illiteracy. Totally, 2019 individuals participated in the study. The participants filled out a questionnaire (using Google Forms) through e-mail or social media. The informed consent of the participants was obtained online before the questionnaire. The study's ethics committee approval was obtained (Decision no: 20/134) and carried out in accordance with the Helsinki Declaration.

Data Collection

Sociodemographic Information Form: The form created by the researchers includes data of age, sex, education level, number of households, employment status, body weight and height, sleep-related changes and their duration, and physical activity status.

Nutritional Habits*:* Changes in the number of meals of the participants, their consumption of food and beverage, cooking and food purchasing behaviors and food stocking status were questioned.

Emotional Eating: To obtain information about emotional eating, six items related to emotional eating in the "Three-Factor Eating Scale" (TFEQTr21), the validity and reliability of which were undertaken by Karakuş et al., were used. The lowest score that can be obtained from the emotional eating sub-factor of the scale is 6, and the highest 24 [7].

Visual Analogue Scale (VAS): It questions the level of stress, appetite, the desire to eat sweets and desserts, anxiety about access to food and its production. Individuals were asked to mark a quantitative value on a 10 cm long line [8,9].

Statistical Analysis

Descriptive statistics were made for all variables. Variance analysis was used when comparing the data obtained from more than two independent groups. The Tukey test was used to find the difference between the groups with a level of significance if the assumption of variance homogeneity was met. The Welch test if the assumption of variance homogeneity was not met, and the Games-Howell test for the difference between the groups that had a level of significance. In the comparison of the averages of the two independent groups, Student's t-test was used when the assumption of normality was met and the Mann-Whitney U test when it was not met. The strength and direction of the relationship between the two quantitative variables were investigated using "Pearson Correlation Analysis" when the assumption of the distribution of normality was met and "Spearman Correlation Analysis" when it was not. The data obtained from qualitative variables were summarized with number and percentage distributions. Besides, the Pearson Chi-Square test (expected value is <25% in all cells) was used to evaluate qualitative variables. All analyzes were performed with the SPSS 22.0, and a value of $p<0.05$ was considered significant.

RESULTS

The total number of participants in this study was 2038, but 19 of them who did not meet the age limit (≥20 years) were excluded, and the study was completed with 2019 participants. The sex distribution was 1589 women and 430 men. The most common occupational group was health care professionals, with a rate of 25.8% (Table 1).

It was found that women had lower BMI values than men but higher EES scores ($p =0.001$). There was no significant difference between the average appetite levels of women and men ($P = 0.282$) (Table 2).

Table 1. Distribution of participants according to their properties (n=2019)

Properties	***n***	**%**
Sex		
Women	1589	78.7
Men	430	21.3
Education		
Literate	2	0.1
Primary school	30	1.5
Secondary school	21	1.0
High school	184	9.1
University	1363	67.5
Master degree/Doctorate	419	20.8
Occupation		
Health Care Professional (Doctor, Nurse, Midwife, Dietitian)	521	25.8
Student	466	23.1
Civil Servant-Worker	197	9.8
Teacher	179	8.9
Housewife	149	7.4
Engineer, Architect, Technical Staff	148	7.3
Craftsmen, Manager, Executive	107	5.3
Academician	60	3.0
Economic Sector (Banker, Economics, Independent Accountant, Finance, Accounting,)	58	2.9
Retired	41	2.0
Justice Personnel (Judge, Attorney, Clerk)	31	1.5
Artist (Musician, Ballerina, Actress/Actor)	24	1.2
Security Forces Personnel	21	1.0
Others (Pilot, Sociologist, Philologist etc.)	17	0.8
Wage-Earning Employment During the Pandemics		
Yes	1017	50.4
No	1002	49.6
Residence During the Pandemics		
At home with family	1840	91.1
At home alone	155	7.7
Hotel/ Dormitory /Guesthouse)	14	0.7
At work	10	0.5
Chronic Disease		
Yes	328	16.2
No	1691	83.8

Table 2: Evaluation of the average of some variables according to sex of participants

	Women (n=1589)		**Men (n=430)**		*P*
	Mean	**SD**	**Mean**	**SD**	
Age	32.25	10.7	36.65	11.0	0.001*
BMI	23.5	4.4	27.1	4.1	0.001†
Total Sleep Time (hours)	7.9	1.7	7.7	1.9	0.007†
Stress Level	5.9	2.3	4.9	2.5	0.001*
Dessert Eating Level	6.2	2.2	5.7	2.1	0.001*
Appetite Level	6.4	1.8	6.5	1.8	0.282**
EES Score	13.2	5.3	11.7	5.3	0.001*

* Independent-Samples T Test with $p<0.05$
** Independent-Samples T Test
† Mann-Whitney U test with $p<0.05$

According to the data obtained on food purchasing and nutritional behaviors in quarantine days, 50.1% of participants stocked food at home. The top 3 most stored foods were: Flour (46.0%), pasta (29.6%), and dried legumes (24.8%). In addition, 62.5% of all participants made and consumed different dishes that they had not made before. The average amount of water consumed during social isolation days was 1.14 (SD 0.6) liters. There was a significant difference between the averages of consumed water in women 1.15 (SD 0.5) and men 1.10 (SD 0.6) (p = 0.006). The nutritional attitudes of the participants are shown in Table 3.

Table 3. Distribution of nutritional attitudes of participants according to their sex

Nutritional Attitudes		**Women (n=1589)**		**Men (n=430)**		**Total (n=2019)**		X^2 *P*
		n	**%**	***n***	**%**	***n***	**%**	
Number of Meals	Increased	494	31.1	123	28.6	617	30.6	X^2=4.199
	Decreased	483	30.4	118	27.4	601	29.8	0.123
	No change	612	38.5	189	44.0	801	39.7	
Daily Amount of Food	Increased	778	49.0	207	48.1	985	48.8	X^2=0.793
	Decreased	301	18.9	76	17.7	377	18.7	0.673
	No change	510	32.1	147	34.2	657	32.5	
Daily Amount of Energy/Calorie Intake	Increased	753	47.4	203	47.2	956	47.4	X^2=0.923
	Decreased	247	15.5	60	14.0	307	15.2	0.820
	No change	363	22.8	101	23.5	464	23.0	
	No Idea	226	14.2	66	15.4	292	14.5	
Daily Frequency of Thinking about Eating	Increased	963	60.6	241	56.1	1.204	59.6	X^2=2.985
	Decreased	178	11.2	52	12.1	230	11.4	0.225
	No change	448	28.2	137	31.9	585	29.0	
Eating Desire of Sweets or Foods Containing Sugar	Increased	841	52.9	181	42.1	1.022	50.6	X^2=17.501
	Decreased	103	6.5	42	9.8	145	7.2	0.001*
	No change	645	40.6	207	48.1	852	42.2	
Amount of Consumed Sweets or Foods Containing Sugar	Increased	782	49.2	174	40.5	956	47.4	X^2=10.409
	Decreased	148	9.3	46	10.7	194	9.6	0.005*
	No change	659	41.5	210	48.8	869	43.0	

* Chi-square with $p<0.05$

A significant relation was found between the stress score and daily amount of consumed food in both women (rs = -.176 p = 0.001) and men (rs = -.215 p = 0.001). While 31.7% of women with a stress score of 1 (4.0%) increased the amount of food, 66.0% of women with a stress score of 10 (6.7%) increased the amount of food. Among men, 30.2% of those with a stress score of 1 (12.3%) increased the amount of food, while 66.7% of those with a stress score of 10 (3.5%) increased the amount of food. The reduction in eating was most common in women with a stress score of 6 (19.8%) and in men with a stress score of 4 (28.9%).

When the BMIs of all participants were grouped according to their sex, it was determined that men were overweight with a maximum of 49.5% and women were in the normal group with a maximum of 64.3%.

The obesity percentage was 8.7% in women and 19.3% in men. A positive correlation was found between age and BMI values of individuals (r = 0.391 p = 0.001).

In the social isolation process, 73.2% of women and 74.7% of men stated that their physical activity decreased. According to BMI groups, a decrease in physical activity was most common among overweight women (76.2%) and healthy weight men (76.9%).

Women doing physical activity at home mostly performed walking (39.9%), pilates (29.6%) and aerobics (14.8%). Men, on the other hand, performed walking (78.0%), weight-lifting (6.4%) and elliptical cycling (5.5%) at home. In quarantine days, involuntary body weight changes were found significant in both sexes compared to BMI groups (p=0.001).

Whereas 51.5% of obese women reported involuntary body weight gain, this rate in obese men was 55.4% (Table 4).

While sleep patterns of 72.4% of all participants changed, there was no significant relationship of this change with sex ($\chi 2 = 0.119$; df: 1; p=0.730). While the percentage of individuals with normal daily sleep time (7-8 hours) was similar in both men (76.5%) and women (75.5%), the percentage of women and men who slept less than 6 hours was 7.8% and 9.5%, respectively (p> 0.05).

Food consumption of individuals was analyzed with 18 different food groups. Distribution of food consumption and statistical relationships between men and women according to BMI groups are shown in Table 5. It was found that fruit consumption of women increased significantly ($\chi 2$=15.783; df: 6; p=0.015). In men, there was a relationship between cereal and starchy food, bread and oil consumption according to BMI groups (p <0.05).

An increase in cereal and starchy food consumption was seen in 44.6% of obese men. Among obese women, the highest increase was in pastry consumption by 52.2%. While the consumption of foods high in fat and sugar, such as biscuits and wafers, increased in 40.8% of all participants, there was no significant relationship between BMI groups in both sexes.

The EES scores and VAS values of the data that may be related to food consumption were evaluated according to the BMI groups of the sexes (Table 6). It was found that the average of appetite level and EES score in both women and men differed between the BMI groups (p<0.05). On the other hand, EES and appetite scores in men showed a difference in obese patients compared to a healthy weight (p <0.05).

In the data obtained, no significant correlation was found between BMI and stress level in women and men (r= -0.006, p=0.804 and r= 0.035, p=0.469, respectively). However, there was a significant positive correlation between EES score and BMI in women and men (r = 0.254, p =0.001 and r = 0.205, p= 0.001, respectively). A significant positive correlation was found between emotional eating and stress in women and men (r=0.169, p= 0.001 and r=0.245, p=0.001, respectively).

A strong positive significant relationship was found between desire to eat dessert and appetite in women and men (r=0.607, p=0.001 and r=0.468, p=0.001, respectively). A positive and weak relationship was found between stress level and desire to eat dessert in women and men (r=0.239, p=0.001 and r=0.149, p=0.002, respectively).

Whereas there was a negative relationship between stress level and average sleep time, this relationship was found significant in women (r= -0.519, p=0.042) but not significant in men (r= -0.510, p=0.287).

Table 4: Distribution of changes in sleep duration, sleep rhythm, physical activity level and weight according to BMI in men and women

	Women											**Men**								
	Underweight (n=118)		**Healthy Weight (n=1021)**		**Overweight (n=312)**		**Obese (n=138)**		**Total (n=1589)**		***X²*** ***P***	**Healthy Weight (n=134)**		**Overweight (n=213)**		**Obese (n=83)**		**Total (n=430)**		***X²*** ***P***
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**		**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Sleep Time																				
Increased	63	53.4	442	43.3	119	38.1	50	36.2	674	42.4	X^2=24.749 0.001*	65	48.5	79	37.1	34	41.0	178	41.4	X^2=5.147 0.273
Decreased	15	12.7	213	20.9	96	30.8	32	23.2	356	22.4		26	19.4	59	27.7	21	25.3	106	24.7	
No change	40	33.9	366	35.9	97	31.1	56	40.6	559	35.2		43	32.1	75	35.2	28	33.7	146	34.0	
Change in Sleep Pattern and Rhythm																				
Yes	90	76.3	735	72.0	226	72.4	96	69.6	1.147	72.2	X^2=1.482 0.686	95	70.9	155	72.8	64	77.1	314	73.0	X^2=1.018 0.601
No	28	23.7	286	28.0	86	27.6	42	30.4	442	27.8		39	29.1	58	27.2	19	22.9	116	27.0	
Physical Activity Level																				
Decreased	82	69.5	742	72.7	240	76.9	99	71.7	1.163	73.2	X^2=3.325 0.344	102	76.1	159	74.7	60	72.3	321	74.7	X^2=0.397 0.820
Not Decreased	36	30.5	279	27.3	72	23.1	39	28.3	426	26.8		32	23.9	54	25.4	23	27.7	109	25.4	
Involuntary Weight Change																				
Increased	27	22.9	443	43.4	177	56.7	71	51.5	718	45.2	X^2=56.603 0.001*	42	31.3	116	54.5	46	55.4	204	47.4	X^2=21.001 0.001*
Decreased	16	13.6	124	12.1	46	14.7	21	15.2	207	13.0		14	10.5	19	8.9	7	8.4	40	9.3	
No change	75	63.6	454	44.5	89	28.5	46	33.3	664	41.8		78	58.2	78	36.6	30	36.1	186	43.3	

* Chi-square with $p<0.05$

Table 5: Distribution of changes in consumed of participants according to BMI

		WOMEN											MEN								
		Underweight (n=118)		Normal (n=1021)		Overweight (n=312)		Obese (n=138)		Total (n=1589)		X^2 P	Normal (n=134)		Overweight (n=213)		Obese (n=83)		Total (n=430)		X^2 P
		n	%	n	%	n	%	n	%	n	%		n	%	n	%	n	%	n	%	
Milk-Yoghurt	Increased	56	47.5	421	41.2	114	36.5	54	39.1	645	40.6	X^2=7.887 0.246	48	35.8	80	37.6	28	33.7	156	36.3	X^2=0.878 0.928
	Decreased	8	6.8	61	6.0	13	4.2	8	5.8	90	5.7		3	2.2	7	3.3	2	2.4	12	2.8	
	No change	54	45.8	539	52.8	185	59.3	76	55.1	854	53.7		83	61.9	126	59.2	53	63.9	262	36.3	
Kefir	Increased	15	12.7	181	17.7	55	17.6	16	11.6	267	16.8	X^2=10.195 0.117	17	12.7	35	16.4	5	6.0	57	13.3	X^2=9.109 0.058
	Decreased	8	6.8	76	7.4	32	10.3	17	12.3	133	8.4		10	7.5	7	3.3	3	3.6	20	4.7	
	No change	95	80.5	764	74.8	225	72.1	105	76.1	1.189	74.8		107	79.9	171	80.3	75	90.4	353	82.1	
Cheese	Increased	41	34.8	348	34.1	104	33.3	34	24.6	527	33.2	X^2=10.980 0.089	45	33.6	76	35.7	29	34.9	150	34.9	X^2=0.602 0.963
	Decreased	9	7.6	50	4.9	9	2.9	5	3.6	73	4.6		3	2.2	3	1.4	2	2.4	8	1.9	
	No change	68	57.6	623	61.0	199	63.8	99	71.7	989	62.2		86	64.2	134	62.9	52	62.7	272	63.3	
Meat-Poultry-Fish	Increased	48	40.7	379	37.1	111	35.6	45	32.6	583	36.7	X^2=3.792 0.705	44	32.8	78	36.6	30	36.1	152	35.4	X^2=2.886 0.577
	Decreased	6	5.1	65	6.4	15	4.8	7	5.1	93	5.9		9	6.7	20	9.4	10	12.1	39	9.1	
	No change	64	54.2	577	56.5	186	59.6	86	62.3	913	57.5		81	60.5	115	54.0	43	51.8	239	55.6	
Eggs	Increased	54	45.8	456	44.7	143	45.8	66	47.8	719	45.3	X^2=6.566 0.363	62	46.3	100	47.0	42	50.6	204	47.4	X^2=1.107 0.893
	Decreased	8	6.8	38	3.7	7	2.2	3	2.2	56	3.5		4	3.0	8	3.8	4	4.8	16	3.7	
	No change	56	47.5	527	51.6	162	51.9	69	50.0	814	51.2		68	50.8	105	49.3	37	44.6	210	48.8	
Oily Seeds	Increased	48	40.7	369	36.1	111	35.6	38	27.5	566	35.6	X^2=11.533 0.073	38	28.4	76	35.7	34	41.0	148	34.4	X^2=4.396 0.355
	Decreased	4	3.4	68	6.7	31	9.9	10	7.3	113	7.1		10	7.5	15	7.0	7	8.4	32	7.4	
	No change	66	55.9	584	57.2	170	54.5	90	65.2	910	57.3		86	64.2	122	57.3	42	50.6	250	58.1	
Olives	Increased	26	22.0	210	20.6	62	19.9	24	17.4	322	20.3	X^2=1.369 0.968	28	20.9	51	23.9	27	32.5	106	24.7	X^2=7.098 0.131
	Decreased	5	4.2	56	5.5	17	5.5	7	5.1	85	5.4		6	4.5	15	7.0	8	9.6	29	6.7	
	No change	87	73.7	755	74.0	233	74.7	107	77.5	1.182	74.4		100	74.6	147	69.0	48	57.8	295	68.6	
Vegetables	Increased	45	38.1	468	45.8	133	42.6	59	42.8	705	44.4	X^2=11.655 0.070	48	35.8	86	40.4	28	33.7	162	37.7	X^2=5.222 0.265
	Decreased	6	5.1	49	4.8	19	6.1	15	10.9	89	5.6		7	5.2	13	6.1	10	12.1	30	7.0	

		WOMEN											**MEN**								
		Underweight (n=118)		**Normal (n=1021)**		**Overweight (n=312)**		**Obese (n=138)**		**Total (n=1589)**		***X²*** ***P***	**Normal (n=134)**		**Overweight (n=213)**		**Obese (n=83)**		**Total (n=430)**		***X²*** ***P***
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**		**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
	No change	67	56.8	504	49.4	160	51.3	64	46.4	795	50.0		79	59.0	114	53.5	45	54.2	238	55.4	
Fruits	Increased	63	53.4	495	48.5	133	42.6	47	34.1	738	46.4	X^2=15.783 0.015*	54	40.3	91	42.7	34	41.0	179	41.6	X^2=2.858 0.582
	Decreased	8	6.8	77	7.5	20	6.4	13	9.4	118	7.4		10	7.5	17	8.0	11	13.3	38	8.8	
	No change	47	39.8	449	44.0	159	51.0	78	56.5	733	46.1		70	52.2	105	49.3	38	45.8	213	49.5	
Bread	Increased	35	29.7	277	27.1	97	31.1	46	33.3	455	28.6	X^2=10.590 0.102	27	20.2	48	22.5	29	34.9	104	24.2	X^2=10.558 0.032*
	Decreased	8	6.8	140	13.7	49	15.7	20	14.5	217	13.7		13	9.7	31	14.6	13	15.7	57	13.3	
	No change	75	63.6	604	59.2	166	53.2	72	52.2	917	57.7		94	70.2	134	62.9	41	49.4	269	62.6	
Rice- Pasta-Bulgur-Potatoes	Increased	44	37.3	321	31.4	96	30.8	45	32.6	506	31.8	X^2=13.024 0.043*	46	34.3	70	32.9	37	44.6	153	35.6	X^2=12.825 0.012*
	Decreased	5	4.2	103	10.1	46	14.7	19	13.8	173	10.9		8	6.0	17	8.0	13	15.7	38	8.8	
	No change	69	58.5	597	58.5	170	54.5	74	53.6	910	57.3		80	59.7	126	59.2	33	39.8	239	55.6	
Butter-Ghee-Margarine	Increased	20	16.9	189	18.5	69	22.1	28	20.3	306	19.3	X^2=7.360 0.289	24	17.9	32	15.0	21	25.3	77	17.9	X^2=4.495 0.343
	Decreased	8	6.8	110	10.8	41	13.1	14	10.1	173	10.9		10	7.5	18	8.5	7	8.4	35	8.1	
	No change	90	76.3	722	70.7	202	64.7	96	69.6	1.110	69.9		100	74.6	163	76.5	55	66.3	318	74.0	
Oil	Increased	18	15.3	166	16.3	56	18.0	26	18.8	266	16.7	X^2=4.087 0.665	17	12.7	44	20.7	18	21.7	79	18.4	X^2=9.696 0.046*
	Decreased	5	4.2	82	8.0	25	8.0	8	5.8	120	7.6		6	4.5	15	7.0	10	12.1	31	7.2	
	No change	95	80.5	773	75.7	231	74.0	104	75.4	1.203	75.7		111	82.8	154	72.3	55	66.3	320	74.4	
Pastry (Cake-Cookies)	Increased	78	66.1	558	54.7	174	55.8	72	52.2	882	55.5	X^2=13.227 0.040*	55	41.0	87	40.9	36	43.4	178	41.4	X^2=3.471 0.482
	Decreased	4	3.4	107	10.5	42	13.5	18	13.0	171	10.8		12	9.0	32	15.0	12	14.5	56	13.0	
	No change	36	30.5	356	34.9	96	30.8	48	34.8	536	33.7		67	50.0	94	44.1	35	42.2	196	45.6	
Snacks (Biscuits-Wafers-Chocolate-Chips etc.)	Increased	44	37.3	412	40.4	124	39.7	64	46.4	644	40.5	X^2=3.808 0.703	51	38.1	95	44.6	34	41.0	180	41.9	X^2=7.685 0.104
	Decreased	17	14.4	175	17.1	52	16.7	22	15.9	266	16.7		14	10.5	38	17.8	14	16.9	66	15.4	
	No change	57	48.3	434	42.5	136	43.6	52	37.7	679	42.7		69	51.5	80	37.6	35	42.2	184	42.8	
Cooked or Frozen (Prepared)	Increased	16	13.6	144	14.1	33	10.6	20	14.5	213	13.4	X^2=4.306 0.635	23	17.2	26	12.2	15	18.1	64	14.9	X^2=6.881 0.142
	Decreased	32	27.1	259	25.4	92	29.5	39	28.3	422	26.6		21	15.7	56	26.3	19	22.9	96	22.3	

Foods		WOMEN											MEN								
		Underweight (n=118)		Normal (n=1021)		Overweight (n=312)		Obese (n=138)		Total (n=1589)		X^2 P	Normal (n=134)		Overweight (n=213)		Obese (n=83)		Total (n=430)		X^2 P
		n	%	n	%	n	%	n	%	n	%		n	%	n	%	n	%	n	%	
	No change	70	59.3	618	60.5	187	59.9	79	57.3	954	60.0		90	67.2	131	61.5	49	59.0	270	62.8	
Vinegar-Pickles	Increased	31	26.3	280	27.4	86	27.6	52	37.7	449	28.3	X^2=14.144 0.028*	30	22.4	50	23.5	17	20.5	97	22.6	X^2=3.979 0.409
	Decreased	9	7.6	65	6.4	33	10.6	12	8.7	119	7.5		8	6.0	25	11.7	10	12.1	43	10.0	
	No change	78	66.1	676	66.2	193	61.9	74	53.6	1.021	64.3		96	71.6	138	64.8	56	67.5	290	67.4	
Alcohol-Alcoholic Beverages	Increased	4	3.4	74	7.3	15	4.8	7	5.1	100	6.3	X^2=8.451 0.207	18	13.4	22	10.3	10	12.1	50	11.6	X^2=1.631 0.806
	Decreased	17	14.4	170	16.7	61	19.6	30	21.7	278	17.5		21	15.7	40	18.8	12	14.5	73	17.0	
	No change	97	82.2	777	76.1	236	75.6	101	73.2	1.211	76.2		95	70.9	151	70.9	61	73.5	307	71.4	

* Chi-square with $p<0.05$

Table 6: Evaluation of stress, appetite, desire to eat desserts and EES scores of women and men according to BMI

	Women (n=1589)									**Men (n=430)**						
	Underweight (n=118)		**Normal (n=1021)**		**Overweight (n=312)**		**Obese (n=138)**		***P***	**Normal (n=134)**		**Overweight (n=213)**		**Obese (n=83)**		***P***
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**		**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	
Stress Level	5.9	2.2	5.9	2.2	5.8	2.5	5.5	2.6	0.316†	4.8	2.5	5.0	2.5	5.0	2.7	0.675‡
Appetite Level	6.2	1.8	6.2	1.8	6.7	1.9	6.7	2.1	0.001†*	6.1	1.8	6.5	1.7	6.9	1.8	0.006‡*
Level of desire to eat desserts	6.0	2.0	6.2	2.2	6.2	2.2	6.4	2.3	0.567‡	5.7	1.7	5.8	2.2	5.9	2.3	0.742†
EES score	11.6	4.3	12.6	5.1	14.5	5.5	15.9	5.4	0.001†*	10.5	5.0	11.8	5.3	13.2	5.3	0.001‡*

†One-Way ANOVA
†*One-Way ANOVA and Tukey multiple-comparison test $p<0.05$
‡Welch
‡*Welch and Games-Howell multiple-comparison test $p<0.05$

DISCUSSION

Governments worldwide are implementing restrictions, collective quarantines, and curfews to control the spread of SARS-COV-2 and prevent people from physical contact [10]. One of the important consequences of quarantine on society is the change in lifestyle, including individuals' eating habits and physical activities [11]. In this study, we investigated the effect of BMI values on eating habits and emotional eating of individuals in social isolation and quarantine in Turkey.

Interruption of work routine due to quarantine or dismissal may cause human boredom [12]. The initial estimates of the International Labor Organization point out that the virus will cause a significant global increase in unemployment and underemployment [13]. In this study, although the majority of the participants have a high education level, almost half of them do not have an income-generating job. In addition to job loss, hearing information about the pandemic during quarantine and the increase in the prevalence of COVID-19 and the resulting constraints further increase the level of anxiety [14,15]. In addition, the scarcity of products due to quarantine and limited working hours of food providers like supermarkets cause anxiety to reach basic products [16]. People may be tempted to buy packaged and long-lasting foods rather than fresh foods because of the concern for access to food. Flour, pasta, and legumes were the most common foods to be stocked in this study. We observed an increase in the production of pastries at home. It was found that the consumption of pastries in women is higher than that of men, and there is a significant relationship between BMI groups.

In this period of stress intensity, high carbohydrate consumption increases serotonin production, which positively affects mood. In a sense, foods rich in carbohydrates can be a way for individuals to cope with stress on their own [17]. However, during these days, when sedentary life prevails, carbohydrate-weighted nutrition can cause weight gain. In our study, it was reported that both women and men had an involuntary increase in weight. This may be due to increased stress intake of nutrients and/or a decrease in physical activity. In involuntary weight increase, the relationship between BMI groups was found significant in both sexes. In all participants, emotional eating increased with increasing weight, and the difference between BMI groups was statistically significant. In people who are sensitive to stress, the hormone cortisol is high, which triggers emotional nutrition [18]. It has been reported that the prevalence of emotional eating is higher in women [19]. EES score increased in both sexes as body weight increased. In a study by Moynihan et al. [12], it was found that anxiety and boredom increased energy intake and consumption of fat and protein. In support of this finding, our study revealed a significant relationship between stress scores and the amount of food consumed daily in both sexes, and it was also found that participants with higher stress increased the amount of food. Torres et al. [20] analyzed the relationship between stress and eating behavior and found that people cope with stress by eating and drinking to feel better.

A weak but significant correlation was found between stress level and desire to eat dessert in men and women in our study. It has been shown that people prefer dried fruits, which they find less delicious during their happy moments, while they prefer to consume foods high in sugar and/or fat in the face of negative emotions [21].

It is an undeniable fact that there may be an increase in obesity in the quarantine period, as emotional hunger and eating cause both an increase in the number of nutrients taken and consumption of high-calorie foods compared to normal. The ratio of individuals whose calorie intake and weight during the quarantine increased was almost half of the participants. Nevertheless, the obesity percentage was 8.7% in women and 19.3% in men in the study. An online questionnaire was used as a data collection tool, and the data were processed according to the participants' statements. In addition, the high education level of the participants, the fact that the majority of the participants in the study are healthcare professionals with a high level of awareness about healthy eating may explain why these values differ from data in the general population in Turkey.

Quarantine-related stress results in sleep disorders, a dangerous vicious circle that makes stress worse and increases nutrient intake [22

]. As an effect of the quarantine, the sleep patterns of 72.3% of the participants have changed. While there was a significant negative relationship between stress and average sleep hours in women, there was no significant relationship in men.

We may assume that the news about higher obesity rates among people who died from SARS-CoV-2 infection may lead obese individuals to a healthier diet. However, our study showed that the food type, the consumption of which increased the most was pastries and that there was an increase in food consumption in more than half of the overweight and obese women in the study. The relationship between BMI and vinegar-pickle consumption draws attention to the changes in food types. Vinegar-pickle consumption increased mostly in obese women. Knowing the positive effects of antioxidant polyphenols and phenolic substances and fermented foods on human health in vinegar [23,24] may have suggested that vinegar may be protective against coronavirus. Pickles are probiotic products and probiotics are effective against pathogens with antimicrobial agents and the

organic acids they secrete [25]. The reason why pickle was used a lot maybe this thought shared by society.

The results of this study showed that the quarantine process changed eating attitudes and behaviors, while the consumption of pastries was the type of food the consumption of which increased the most among all participants, the consumption of eggs, fruits, and vegetables which are all healthy foods increased as well in descending order of amount. It is important to pay attention to nutritional habits during quarantine by following a healthy and balanced diet that contains high amounts of minerals, vitamins, and antioxidants. Various studies have reported that fruits and vegetables containing vitamins and minerals can improve immune function [26,27]. The results of the study show that consumption of vegetables and fruits increased, and women consumed more vegetables than men. The change in fruit consumption was found to be significant in women according to BMI groups. Another increase in the food group was dairy products; milk, yogurt, kefir, and cheese consumption increased in both sexes, but no significant relationship was found.

It is crucial to keep physical activity during quarantine, and the World Health Organization has published a guideline to "stay physically active during self-quarantine" to improve healthy behavior [28]. Quarantine increases activities with very low energy consumption, which are mostly performed in a sitting or supine position [29]. It has been reported that the proportion of those sitting more than 8 hours in the quarantine period increased from 16% to 40% [11]. Low levels of physical activity even for a short time, can negatively affect physical and mental health. During the quarantine process, decreasing physical activity along with higher calorie intake and an unhealthy diet will contribute to weight gain. This study showed that 73.5% of the participants decreased their physical activity level, supporting this idea. The rate of those who continue to do physical activity in the quarantine process is low. The leading activities were pilates, weight-lifting, and exercises performed through various applications at home.

As a result, EES scores increased as BMI values increased in men and women, and involuntary weight gain was detected in both sexes in our study. It was determined that higher BMI among the participants increased emotional eating and changed the nutrition behavior. Healthy eating is now a priority. In this period, consuming foods that are good sources of nutrients that support the immune system, paying attention to portion control, trying to be physically active with exercises that can be done at home, and maintaining a healthy sleep pattern can serve to reduce the negative effects of quarantine on health, especially obesity.

There are some limitations of this study. The first limitation is that people who are illiterate and do not have internet access cannot be reached within the scope of the study due to the use of an online questionnaire. Another limitation is that the body weight and height values were based on the individuals' self-reports, which risk source bias.

CONCLUSIONS

The findings show that the participants' eating habits have changed in quarantine-related social isolation, emotional eating has increased in direct proportion with BMI, and involuntary weight gain has increased.

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Conflicts of Interest

The authors report no conflicts of interest.

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