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Research Report

Changes in nutrition and lifestyle habits during the COVID-19 pandemic in Turkey and the effects of healthy eating attitudes

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Abstract.
BACKGROUND: Social isolation required by the pandemic has led to some changes in individuals' eating and lifestyle habits.
OBJECTIVE: This study aimed to examine the change in nutrition and lifestyle habits of Turkish people during the COVID-19 outbreak and investigate the effects of individuals' attitudes to healthy eating on this change.
METHOD: At the beginning of the pandemic, individuals over the age of 18 participated in this cross-sectional study using an online questionnaire. Demographic information (age, gender, education level, place of residence and occupation), anthropometric data (reported weight and height); nutritional behavior information (number of meals per day, changes in consumption of various foods, use of nutritional supplements, etc.) and changes in lifestyle habits were requested from the participations. In addition, the Healthy Nutrition Attitude Scale (ASHN) was used to determine the healthy eating attitudes of the participants.
RESULTS: A total of 432 volunteers participated in the study. It was revealed that body weight increased in 38.0% of the participants and activity level decreased in 73.1% of them during the initial stage of the pandemic. Nevertheless, 44.7% of participants reported increased sleep time, 77.8% reported increased social media use, and 66.7% reported increased stress and anxiety. It was found that the most commonly used nutritional supplements during this period were vitamin C, vitamin D and multivitamin complex. Women have significantly higher ASHN scores compared to men ($p < 0.001$). The total ASHN scores of those whose body weight did not change and those who increased their activity level were found to be significantly higher. It was determined that as the age and education level increased, the healthy eating attitude increased.

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CONCLUSION: In this study, findings regarding the negative effects of the COVID-19 quarantine on the nutrition and lifestyle of the Turkish people are presented. However, those with a positive attitude toward healthy eating were observed to have better weight control and eating habits and stress management during the pandemic. Therefore, it is thought that the dissemination of healthy eating attitudes in society may contribute to the maintenance of physical and mental health in the event of a pandemic.

Keywords: Nutrition, COVID-19 pandemic, healthy eating attitude, lifestyle habits

1. Introduction

With the declaration of the COVID-19 epidemic as a pandemic by the World Health Organization (WHO) strict measures, including travel bans and quarantine, have been taken in many countries to prevent the spread of the epidemic. Prolongation of this process has forced psychological conditions such as stress, anxiety, and fear, and as a result, there have been some changes in individuals' routine lifestyle habits [1, 2]. Besides its effects on sleep, physical activity and social life, quarantine stress has caused significant changes in the eating habits of individuals [3, 4].

Pandemics are health events that caused changes in the economy, education, management, and lifestyles and brought about global impacts in world history. During the coronavirus pandemic, there have been changes not only in education, working methods, social relations, and consumption preferences but also in eating habits. At the night and on the following day of March 10, 2020, when Turkey announced its first case of coronavirus, the demand for health products and culinary products related to "pantry preparation" increased rapidly at the same time [5].

According to the report by Ipsos investigating the effect of the COVID-19 on consumer behavior conducted with 1000 people aged over 18 years of age, the demand for cologne, vinegar, and pasta elevated during the first week following the confirmation of the first case in Turkey. However, this interest decreased in the following weeks. On the other hand, the rate of food ordering was 13% in the first week and increased to 38% in the third week [6].

In one of the first studies conducted after the COVID-19 lockdown, it was found that the most consumed foods were fruits, poultry, nuts, vegetables and legumes at the rates of 9.48%, 9.35%, 9.22%, 8.83% and 8.83%, respectively [7]. In the study, it was reported that the consumption of homemade and fresh foods (fruits, vegetables, pizza and desserts, hot drinks, dairy products and yoghurt, legumes, white meat) was increased. In contrast, there was a decrease in the consumption of take-out orders (pizza and packaged desserts), processed meat, canned fish and alcoholic beverages.

In a cross-sectional study, changes in eating habits and lifestyle caused by staying at home/working from home at the beginning of the COVID-19 outbreak in China were investigated. While most of the participants maintained their usual diet, 38.2% reported increase in snack intake, 54.3% reported decrease in physical activity, and 45.5% reported increase in sleep duration. The rate of those who reported an increase in body weight was found as 25%. Staying at home/working from home has been associated with increased consumption of animal products, vegetables, fruits, mushrooms, nuts, water, and snacks, as well as an increase in sleep duration and frequency of skipping breakfast [8].

In another study, weight gain was reported to be 30.6%, and the main factors causing this weight gain were increased food intake and decreased physical activity [9].

Methods used for protection against coronavirus have created the "new normal" in consumer behavior. It is an expected situation that consumers show more buying behavior with the feelings of fear and panic in case of uncertainty. Needs for food, which constitute the lowest level of Maslow's hierarchy of needs, is the most

important spending item for consumers. Many consumers are observed to demonstrate stocking behavior during the periods of uncertainty. Moreover, stress triggers the development of intense demand for a specific food or the desire to consume excessively especially in sensitive individuals [10]. It is known that individuals under stress tend to consume foods containing high fat and sugar more [11]. As a result, the frequency of stress-triggered eating disorders increases and concerns are raised about the elevated risk of chronic diseases that are influenced by unhealthy eating habits and inactivity [4].

In a study conducted to evaluate the effects of home quarantine on the nutritional habits, lifestyle and emotional balance of the Spanish people, it was found that sleep quality was impaired in 39.7% of the participants, 44.7% of participants could not do physical exercise, and body weight increased in 38.8% of them. According to the emotional eating questionnaire, 21.8% of the participants were classified as emotional eater and 11% as very emotional eater [12].

It is observed that individuals have started searching new ways to manage their diet and lifestyle habits during this period. Remote shopping in several categories, especially in food products, has rapidly risen during the pandemic [3]. The new lifestyle and the stress brought about by the pandemic have been managed healthily by some individuals, but it is an expected result that this new lifestyle leads to the development of various health problems, anxiety disorders and eating disorders in some others.

In a systematic review examining dietary changes during the first lockdown of COVID-19, it was determined that the lockdown affected dietary habits both positively and negatively. Adverse eating habits have been linked to other poor lifestyle outcomes such as weight gain, mental health problems, and limited physical activity. In this review, 11 studies reported positive changes in eating habits, with an increase in fresh and home cooked foods, and a reduction in take-out food and alcohol consumption [13].

This study aimed to investigate the changes in nutrition and some lifestyle habits of Turkish people during the COVID-19 pandemic and to examine the effects of individuals' healthy eating attitudes on this change.

2. Material and methods

2.1. Research model, population and sample

This is a descriptive study, which was conducted in Turkey through the internet in April 2020, i.e., at the end of the first month after WHO declared COVID-19 as a pandemic. In this study, we used the voluntary response sampling, which is one of the non-probability sampling methods. All healthy volunteers, who were aged 18 years and above, were included in the study. The Attitude Scale for Healthy Nutrition (ASHN) score was used to determine the sample size. The ideal ASHN score was calculated as 85–105 on the scale. In our study, the mean total ASHN score was 79.8 and the standard deviation was 11.1. When power analysis was performed using these values, the sample size with 100% power was calculated as 432.

2.2. Tools

In this study, the individuals were reached out by an online survey created by using Google Forms. The survey is consisted of 4 sections. In the first section, there are questions on anthropometric measurements (body weight and height) as well as those on socio-demographic data such as age, gender, education level, occupation, marital status, and income level. In the second section of the survey, the participants were asked about the change in the number of their daily snacks and main meals and the changes in the frequency of consumption of various foods, sleep duration, activity level, body weight, smoking and alcohol consumption, duration of social media use as well as the change in concern/anxiety level (increased/decreased/not changed/unknown). The third section asked the participants about their use (used in the past/have used for the last one month/never used/unknown) of various dietary supplements (vitamins, minerals, herbals etc.). The fourth section included the Attitude Scale for Healthy Nutrition (ASHN).

Table 1
The Cronbach's alpha values of the items that make up each factor of the ASHN

Factors	KN	EN	PN	MN	Total ASHN
Cronbach's alpha	0.964	0.797	0.875	0.827	0.852
N of items	5	6	5	5	21

ASHN: The Attitude Scale for Healthy Nutrition, KN: Knowledge on nutrition, EN: Emotion for Nutrition, PN: Positive Nutrition, MN: Malnutrition.

Table 2
Descriptive statistics of the ASHN and subscales

	N	Minimum	Maximum	Mean	Std. Deviation
KN	432	5.00	25.00	20.7569	4.63755
EN	432	6.00	30.00	17.3981	5.44100
PN	432	5.00	25.00	18.3032	5.10613
MN	432	5.00	25.00	9.7963	4.39206
ASHN	432	22.00	105.00	66.2546	12.45707

In order to evaluate the nutritional status of the participants, their current body weights and height were asked, and the Body Mass Index (BMI) values were calculated by the researchers based on the BMI = body weight/height^2 formula. The calculated BMI values were classified according to WHO criteria [14].

Participants answered all items in the socio-demographic information form with the self-report method. Moreover, they answered the questions about the changes in lifestyle and eating habits during the pandemic as increased/decreased/not changed based on their own perceptions.

The scale (ASHN) was developed by Tekkurşun Demir and Cicioğlu [15], and its reliability and validity analyze were carried out by the same authors. The questions in the scale are scored from 1 to 5 as "Strongly Disagree", "Disagree", "Undecided", "Agree", "Strongly Agree". ASHN has a structure consisting of 21 items and 4 factors. These factors are referred to as Knowledge on Nutrition (KN), Emotion for Nutrition (EN), Positive Nutrition (PN) and Malnutrition (MN). In ASHN, the lowest possible score is 21 and the highest possible score is 105. The score a participant gets from ASHN show the attitude level for healthy nutrition: 21 points = very low, 23–42 points = low, 43–63 points = moderate, 64–84 = high and 85–105 = ideally high attitude [14].

Table 1 shows the Cronbach's alpha values of the items that make up each factor of the scale. Descriptive statistics of the ASHN and subscales are given in Table 2. The results show that the sub-dimensions of the scale have high internal consistency and that the scale is reliable.

2.3. Data collection

The tools used in the study were spread on the internet and delivered to the volunteer participants. A total of 437 participants were reached within the scope of the study. Five of these participants were excluded from the study because they were younger than 18 years. As a result, the study was completed with 432 people.

The study was conducted in accordance with the Helsinki Declaration. Participants were informed about the study and their consent was obtained through Google Forms. Ethical approval (No: 61351342/2020–268, dated 27-MAY-2020) was obtained from Usküdar University Non-invasive Clinical Research Ethics Committee.

2.4. Statistical evaluation

Study data was analyzed with the SPSS 26 Statistical package program. Prior to comparisons, the One-Sample Kolmogorov-Smirnov Test was employed to investigate whether the quantitative data were suitable for normal

Table 3
One-Sample Kolmogorov-Smirnov Test

		KN	EN	PN	MN	ASHN
N		432	432	432	432	432
Normal parameters[a,b]	Mean	20.7569	17.3981	18.3032	9.7963	66.2546
	Std. Deviation	4.63755	5.44100	5.10613	4.39206	12.45707
KS Test	Absolute	0.218	0.095	0.124	0.147	0.123
	Positive	0.180	0.052	0.095	0.147	0.082
	Negative	–0.218	–0.095	–0.124	–0.137	–0.123
Kolmogorov-Smirnov Z		4.522	1.974	2.573	3.058	2.549
Asymp. Sig. (2-tailed)		0.000	0.001	0.000	0.000	0.000

[a]Test distribution is Normal. [b]Calculated from data. ASHN: The Attitude Scale for Healthy Nutrition, KN: Knowledge on nutrition, EN: Emotion for Nutrition, PN: Positive Nutrition, MN: Malnutrition.

distribution or not, and the distributions were found to be normal (Table 3). Therefore, parametric tests were used. The Independent Samples T Test was used to make comparison between qualitative variables and quantitative variables with two categorical groups while the One-Way ANOVA was used to compare qualitative and quantitative variables with more than two categorical groups. The comparisons between quantitative variables were performed with the Pearson's Correlation Analysis. The Chi-Square Independence Test, a nonparametric method, was used for paired comparison of qualitative variables and $p < 0.05$ was considered statistically significant.

3. Results

3.1. Findings related to demographic characteristics

A total of 432 volunteers (72.2% female and 27.8% male) with an average age of 32.68 ± 12.14 years participated in the study. The average age of women is 32.47 ± 11.60 years, and the average age of men is 33.17 ± 13.55 years ($p > 0.05$). Body Mass Index (BMI) of women ($22.96 \pm 4.24\,kg/m^2$) was found to be significantly lower than that of men ($25.67 \pm 3.17\,kg/m^2$) ($p < 0.001$). Of all participants, 55.8% is single, 50.5% is undergraduate and 52.3% have a monthly income of < 5000 TL. While 56.9% of the participants consume 2 main meals a day, 35.9% consume one snack and 35.6% consume two snacks. While 56.7% of the participants stated that the number of meals did not change, 24.1% stated that it decreased and 19.2% increased. While 50% of the participants stated that they did not feel a change in appetite, 37% reported an increase and 13% reported a decrease in appetite. More than half of the participants (57.87%) live in the Marmara Region, where Istanbul and its surrounding cities are located. Distribution by demographic data is given in Table 4.

3.2. Findings related to increase in the consumption of some foods

Some participants reported increased consumption for eggs (43.5%), cheese (31.3%), vegetables (36.8%), fruits (44.7%), tea (45.6%), coffee (36.1%), water (48.6%), milk puddings (32.2%), olive oil (30.6%), legumes (27.5%), walnut (29.6%), hazelnut (26.2%) and honey/molasses (28.9%). 30.6% of the participants also reported an increase in the consumption of packaged food products. The rate of increase in the consumption of another foodstuff is relatively lower.

Table 4
Participants' distribution by demographic data

Variables		*n*	%
Gender	Female	312	72.2
	Male	120	27.8
Marital status	Married	177	41.0
	Single	241	55.8
	Divorced/widow	14	3.2
Educational background	Graduate of primary school, secondary school or high school	44	10.2
	Bachelor's degree	218	50.5
	Master degree	111	25.7
	Doctorate degree	59	13.7
Smoking	Yes	98	22.7
	No	334	77.3
Alcohol	Yes	98	22.7
	No	334	77.3
Number of main meals	1	9	2.1
	2	246	56.9
	3	169	39.1
	Other	8	1.9
Number of snacks	1	155	35.9
	2	154	35.6
	3	57	13.2
	Other	66	15.3
BMI (kg/m^2), $x \pm SD$	Female	22.96 ± 4.24	
	Male	25.67 ± 3.17	
Age (year), $x \pm SD$	Female	32.47 ± 11.60	
	Male	33.17 ± 13.55	
Region of residence (*n*, %)	Marmara	250	57.87%
	Central Anatolia	97	22.45%
	South Anatolia	15	3.47%
	Other regions	70	16.20%

3.3. Scores related with ASHN

The mean total ASHN score is 79.79 ± 11.08 and 31% of the participants have an ideal eating attitude while 54.6% of them have a high healthy eating attitude. The lowest score among the subscales was obtained from the "Positive Nutrition (PN)" subscale. Distribution of participants according to the total ASHN score and sub-scale scores is given in Table 5.

It is observed when the total scores of ASHN by gender are analyzed that women have significantly higher scores compared to men (78.97 ± 11.55 and 74.97 ± 12.29, respectively; $p = 0.002$).

When the association of the total ASHN score with marital status, education level and profession is examined, it is observed that singles have the lowest score ($p < 0.05$) and that the ASHN score increases in parallel with education level ($p < 0.001$). No significant difference is observed in terms of profession (Table 6).

The relationship between healthy eating attitude level and age is given in Table 7. According to the *Post-hoc* Tukey test, there is a significant difference between all paired groups regarding the relationship between healthy eating attitude level and age; as the age advanced, healthy eating attitude became ideal.

Table 5
The ASHN total and subscale scores and their distribution according to healthy eating attitude levels

Total and subscale scores of ASHN	Minimum	Maximum	Mean	Standard Deviation
Total score	49.0	105.00	79.8	11.1
Knowledge on nutrition	5.00	25.00	20.8	4.6
Emotion for nutrition	12.00	30.00	20.1	4.4
Positive nutrition	5.00	25.00	18.3	5.1
Malnutrition	10.00	25.00	20.7	3.6
Healthy eating attitude levels	N		%	
Medium	62		14.4	
High	236		54.6	
Ideal	134		31.0	
Total	432		100.0	

3.4. Findings related with participants who used nutritional supplements

The rate of nutritional supplement use in the last 1 month was as follows: Vitamin C 25.9%, multivitamin 19.0%, B complex vitamins 13.7%, vitamin D 28.7%, iron 11.6%, zinc 12.0%, omega–3 10.9%, probiotic 11.1%, ginger/turmeric 19.0%, and propolis 12.0%. The rate of participants who use other dietary supplements is less than 10%. The proportion of women who used vitamin C ($p = 0.011$), iron ($p = 0.000$), zinc ($p = 0.000$) and vitamin D ($p = 0.000$) supplements in the last month was found to be significantly higher compared to men.

3.5. Findings related with use of nutritional supplements and the total ASHN score

As seen in Table 8, a significant correlation was found between the use of omega-3, probiotic, vitamin D and ginger/turmeric supplements and the total ASHN scores. However, no significant relation was identified between the use of vitamin C, iron, zinc and propolis and the total ASHN score.

3.6. Findings related with changes in lifestyle habits and the total ASHN score

Table 9 shows the changes in the participants' body weight, daily activity levels, sleep duration, general well-being, future anxiety, the duration of social media use and the use of dietary supplements, and their relations with the total ASHN scores.

While 47.5% of the participants said that their body weight did not change, 73.1% stated that their activity level decreased. Nevertheless, participants reported prolonged sleeping durations (44.7%), increased social media use (77.8%) and elevated concern/anxiety level (66.7%) for the last one month.

Accordingly, it was found that those whose body weight did not change have the highest (79.3) ASHN score while the score of those whose weight increased is the lowest (75.8) ($p = 0.015$).

Considering the association of the total ASHN score with changes in activity level, participants whose daily activity level increased has the highest (82.2) total ASHN score, whereas those whose daily activity decreased has the lowest (76.9) score ($p = 0.012$).

No significant correlation has been found between the total ASHN score and the changes in sleep duration, general well-being, future anxiety, social media use, and the use of dietary supplements. However, it has been observed that those whose daily sleep duration, general well-being and use of dietary supplements did not change have higher ASHN total score, and also those whose concerns about the future and social media usage decreased have higher ASHN scores.

Table 6
Association of total ASHN score with marital status, education level and profession

Variables	Total ASHN score				F	*p*
	N	%	Mean	Std. Deviation		
Marital status (a)						
Married	177	41.0	79.5	11.6	3.107	0.046
Single	241	55.8	76.6	12.2		
Divorced/widow	14	3.2	78.6	7.5		
Total	432	100.0	77.9	11.9		
Educational background (b)						
High school diploma	13	3.0	69.3	15.5	5.000	0.001
Associate degree	28	6.5	75.8	13.1		
Bachelor's degree	218	50.9	76.6	11.6		
Post graduate	111	25.8	79.6	12.0		
Doctorate	59	13.8	81.9	9.6		
Total	429	100.0	77.8	11.9		
Profession (c)						
Unemployed	12	2.7	77.1	10.9	1.625	0.097
Under-postgraduate student	124	28.7	76.2	12.6		
Healthcare personnel	81	18.8	80.6	12.5		
Officer	47	10.9	77.8	10.5		
Worker	21	4.9	72.0	12.6		
Academician	76	17.6	79.5	10.2		
Retired	17	3.9	79.4	12.3		
Manager	15	3.5	76.1	14.0		
Engineer	12	2.8	78.6	9.9		
Self-employed	10	2.3	82.0	11.5		
Other	17	3.9	75.2	10.9		
Total	432	100.0	77.9	11.9		

a) According to the *Post Hoc*-Tukey Test, the difference results from the single individuals who have the lowest scores. b) The *Post Hoc*-Tukey Test indicates that differences between all pairs, except the associate degree-bachelor's degree pair, are significant. As the education level increases, the ASHN scores elevate. c) There is no significant difference between total scores regarding profession.

Table 7
Relationships between Attitude of Healthy Eating levels and age

AHE level	N	Mean age (year)	Std. Deviation	F	*P*
Medium	62	28.2581	10.65085	6.248	0.002[a]
High	236	32.6229	11.72294		
Ideal	134	34.7836	13.08811		
Total	432	32.6667	12.16705		

AHE level: Attitude of Healthy Eating level. [a]According to the *Post Hoc* Tukey Test, there are differences between all pairs in age and total ASHN scores. The attitude for healthy eating becomes ideal with advancing age.

Table 8
Relation of the use of some dietary supplements with the total ASHN score

Dietary supplements	Total ASHN score				F	*p*
	N	%	Mean	Std. Deviation		
Vitamin C						
I've never used	195	45.1	76.9	12.5	0.816	0.486
I used in the past	111	25.7	78.4	11.3		
I have used it in the last 1 month	112	25.9	78.5	11.5		
I have used it in the past and within the last 1 month	14	3.2	80.5	10.1		
Iron						
I've never used	221	51.2	76.8	12.2	1.240	0.295
I used in the past	158	36.6	78.8	11.6		
I have used it in the last 1 month	50	11.6	79.4	11.0		
I have used it in the past and within the last 1 month	3	0.7	78.7	7.5		
Zinc						
I've never used	291	67.4	77.7	12.1	0.490	0.689
I used in the past	83	19.2	77.3	10.9		
I have used it in the last 1 month	52	12.0	79.3	11.9		
I have used it in the past and within the last 1 month	6	1.4	81.3	13.7		
Omega 3						
I've never used	246	56.9	76.4	11.6	4.433	0.004[a]
I used in the past	129	29.9	78.7	12.2		
I have used it in the last 1 month	47	10.9	82.3	12.2		
I have used it in the past and within the last 1 month	10	2.3	83.1	6.8		
Vitamin D						
I've never used	145	33.6	74.7	12.5	8.195	0.000[b]
I used in the past	151	35.0	78.0	11.6		
I have used it in the last 1 month	124	28.7	80.4	10.8		
I have used it in the past and within the last 1 month	12	2.8	87.2	5.8		
Propolis						
I've never used	305	70.6	77.5	12.1	0.749	0.523
I used in the past	69	16.0	77.9	10.3		
I have used it in the last 1 month	52	12.0	80.1	12.2		
I have used it in the past and within the last 1 month	6	1.4	79.5	15.9		
Ginger or turmeric						
I've never used	228	52.8	76.7	12.0	3.985	0.008[c]
I used in the past	101	23.4	77.2	12.4		
I have used it in the last 1 month	82	19.0	81.9	9.9		
I have used it in the past and within the last 1 month	21	4.9	77.8	12.5		
Probiotic						
I've never used	278	64.4	77.0	11.9	2.874	0.036[d]
I used in the past	92	21.3	78.0	11.9		
I have used it in the last 1 month	48	11.1	80.6	11.0		
I have used it in the past and within the last 1 month	14	3.2	84.6	11.6		

[a]According to the *Post-Hoc* Tukey test, the total score (76.3 ± 11.5) of the group that did not use omega-3 was significantly lower than that of the others ($p = 0.004$). Participants who used omega-3 supplements in the past and in the last one month have the highest (83.1 ± 6.8) total ASHN score. [b]There is significant difference between all groups according to the *Post-Hoc* Tukey test. As the frequency of the use of vitamin D increases, the total ASHN score elevates. Participants who used vitamin D in the past and in the last one month have the highest (87.2 ± 5.8) total ASHN score. [c]According to the *Post-Hoc* Tukey test, the significant difference occur between those who never used supplements and those who used supplements within the last 1 month. The total ASHN score (81.8 ± 9.8) of the participants using dietary supplements with turmeric/ginger content in the last month is significantly higher than the score of the non-users (76.7 ± 12.0) ($p = 0.008$). [d]As the frequency of the use of probiotics increases, the total ASHN score elevates. Whereas the participants who never used probiotics have the lowest score 77.0 ± 11.8), those used probiotics in the past and in the last one month have the highest (84.6 ± 11.6) total ASHN score ($p = 0.036$).

Table 9
Distribution of the changes in body weight, daily activity level, sleep duration, general well-being, future anxiety, the duration of social media use and the use of dietary supplements and relation of the total ASHN scores with these changes

Variables	N	%	Total ASHN score	*p*
Body weight				
Increased	164	38.0	75.8	0.015
Not changed	205	47.5	79.3	
Decreased	63	14.6	78.7	
Daily activity level				
Increased	39	9.0	82.2	0.012
Not changed	77	17.8	79.6	
Decreased	316	73.1	76.9	
Daily sleep duration				
Increased	193	44.7	76.9	0.082
Not changed	171	39.6	79.4	
Decreased	68	15.7	76.6	
General well-being				
Increased	34	7.9	78.2	0.267
Not changed	216	50.0	78.7	
Decreased	182	42.1	76.8	
Future concern				
Increased	288	66.7	77.7	0.843
Not changed	124	28.7	78.1	
Decreased	20	4.6	79.1	
Duration of social media use				
Increased	336	77.8	77.4	0.268
Not changed	72	16.7	78.9	
Decreased	24	5.6	81.0	
Consuming of nutritional supplements				
Increased	96	22.2	77.9	0.740
Not changed	309	71.5	78	
Decreased	27	6.3	76.1	

4. Discussion

In our study, 38.0% of the participants reported that their body weight increased, 73.1% reported a decrease their physical activity, and 44.7% reported that their daily sleep duration has increased. Moreover, 66.7% of the participants stated that their concerns about the future have increased, 77.8% stated that their social media usage time increased. While the use of nutritional supplements was unchanged in 71.5% of the participants, an increase was reported in 22.2% of the participants. According to the total ASHN score, 54.6% of the participants were found to have a high level of healthy eating attitude.

Similar to the results of our study, in various studies, it was found that pandemic and home quarantine caused changes in nutrition and lifestyle habits [7, 8, 12, 13]. It was determined that while body weight and sleep duration increased, physical activity decreased, as well as anxiety and stress increased.

In a study conducted to examine the impact of the COVID-19 lockdown on the eating behavior and lifestyle of the Kurdish population in Iraq; it was reported that 50.9% of the participants stated that their lifestyle has

deteriorated. In particular, it was found that the frequency of physical activity decreased, and sleep hours increased significantly during lockdown. Regarding eating habits, 29.3% reported increased appetite and 32.4% reported weight gain as in our study [7].

In a cross-sectional study conducted in April 2020 to evaluate the eating habits and lifestyle behaviors of those living in the Middle East and North Africa (MENA) region, more than 30% of participants reported gaining in their weight. Also, 39.1% reported that they were not physically active and more than 35% reported that they were spending more than 5 hours on screens. Although a high percentage of respondents reported sleeping more hours per night during the pandemic, 63% of them reported sleep disturbances. Most of the participants reported physical and emotional exhaustion, irritability, and tension [16].

Similar to the results of our study, a study examining the effect of the Italian population on eating habits and lifestyle changes at the beginning (April 2020) of the COVID-19 epidemic reported a perception of weight gain was observed in 48.6% of the population [17].

In the study of Lopez-Moreno et al. [12] investigating lifestyle changes in the first months of quarantine in Spain, it was stated that 38.8% of the population gained weight, while 39.7% had poor quality of their sleep. The increase in body weight was reported to be positively correlated with age and BMI.

In this study 72.2% of the participants are women. There is no significant difference in terms of the average age by gender. Nevertheless, the mean BMI of women ($22.96 \pm 4.24\,kg/m^2$) is significantly lower than that of men ($25.67 \pm 3.17\,kg/m^2$) ($p = 0.000$). This result is consistent with other studies indicating higher BMI values in men [18, 19].

It was reported in a study examining the relationship between overweight/obesity and various socio-demographic indicators among different immigrant groups in Norway [19] that generally immigrant men were 52% more likely to be overweight/obese compared to women. The fact that, similar to the reported results, the mean BMI of women was lower compared to men in our study may be a result of the fact that women give more importance to their body image and nutrition than men do.

In our study, 56.9% of participants reported consuming two main meals a day and 39.1% three main meals; and again, 35.9% of participants reported consuming one, 35.6% two snacks in a day. In addition, 56.7% of respondents stated that the number of daily meals they had was not changed and 24.1% reported their number of daily meals as decreased. 37% of respondents reported an increase in their appetite, while 50% noted no change.

In another study, similar to the results of our study, 29.3% of the participants stated that they felt their appetite increased, and 14.3% stated a decrease in their appetite [7]. The change in appetite during lockdown was found to be significantly associated with age, gender and BMI.

In a study of Al-Domi et al conducted in Jordan in March-April 2020, it was found that there had been a significant increase in the number of snacks and main courses and body weight [20].

A study conducted in Poland reported that the most frequent number of meals per day during quarantine was three as 30.3% and four as 39.3%, while snacks were one as 28.3% and two as 36.1%. People with higher BMI reported increased food consumption and snack numbers [21]. This study also showed that overweight/obese, and older people (ages 36–45 and >45) tended to gain weight more often, while those who were underweight tended to lose more weight.

Yang et al. and Di Renzo et al. [8, 17] have found that the snack consumption increased the most among all food types. The condition was interpreted as being likely to be caused by anxiety, depression or boredom during the lockout. Unlike other studies, in our study, it is thought that the reason why the number of snacks per day and total snack consumption was not increased too much, is that the majority of participants had high healthy eating attitudes. Again, it was thought that the decrease in activity and unchanged appetite of the majority of participants contributed to the decrease in the number of meals consumed daily.

There are studies in the literature confirming that women have higher nutrition literacy, nutritional behavior, and nutritional quality scores than men [22–24]. In our study, the total ASHN score of women is significantly higher than the score of men. The fact that women are more knowledgeable about nutrition and have better attitudes for healthy nutrition than men may be a result of the fact that in our society, generally women are responsible for

the nutrition of the whole family, especially of children, and therefore women have higher tendency to reach and apply more accurate information about nutrition. In our study, men have higher BMI values but lower ASHN total scores which indicate that nutritional knowledge level of men needs to be further improved.

In our study, which evaluates healthy eating attitudes with ASHN, no one was identified to have a poor healthy eating attitude and the majority of the participants had high (54.6%) and ideal (31%) eating attitudes (Table 5).

The curfew and quarantine implemented as a result of the pandemic have led to changes in the usual eating and lifestyle habits of individuals. It was determined in our study that the body weight did not change in 47.5% of the participants, but the activity level decreased in 73.1% in the last 1 month (Table 9). Whereas the participants who reported an increase in their body weight (%38) during this period have lower ASHN total scores than the others, and those whose weight did not change have the highest ASHN scores ($p = 0.015$). Furthermore, the participants whose activity level increased in the last one month have the highest ASHN total scores ($p = 0.012$). This result was interpreted as those good attitudes for healthy eating can help prevent obesity and related diseases through management of the body weight and activity level during crisis periods in a better way.

It is predicted that separation from loved ones, restriction of freedom, and uncertainties related to the course of the disease during the quarantine period may have dramatic effects on mental status, resulting in increased stress, anxiety and anger as well as potential communication difficulties and behavioral problems [2]. In our study, 44.7% of the participants had prolonged sleep duration and 66.7% had anxiety/stress and concern. This indicates the effects of the changes that the quarantine process caused on individuals' mental health. Similarly, it has been shown in various studies that the sleep duration of the individuals has increased in the first period of COVID-19 lockdown [7, 8, 16, 17].

According to the research conducted by the consulting company Kantar, the countries which are most strongly concerned about the COVID-19 epidemic are Turkey and Spain. The anxiety level of the people living in these countries has been reported to be around 90% for the population aged over 35 years [25].

Wang et al. [26] reported that more than half of respondents rated the psychological impact as moderate to severe, and one third reported moderate to severe anxiety in the initial phase of the COVID-19 outbreak in China. Similarly, 66.7% of the participants in our study reported increased anxiety and worry. Negative psychological effects are known to lead to emotional eating and sweet cravings.

In a study [3] carried out to demonstrate the changing of consumer behaviors during the pandemic process, 86% of adults living in Turkey stated that their social media use had increased. Due to both the need to stay at home and the comfort it provides, remote shopping in several categories, especially in food products, has rapidly increased during the pandemic.

In a study conducted in the MENA region, approximately 35% of respondents reported that they were spending more than 5 hours a day on the computer to work or study during the pandemic, compared with the rate of 24.0% before the COVID-19 was locked out. In addition, the proportion of participants spending more than 5 hours a day on screens for entertainment increased from 14.6% before the outbreak to 37.5% during the pandemic [16].

Similarly, in our study, 77.8% of the participants reported that their social media use had increased. The changes in social media use are not associated with the total ASHN score. However, it was observed that while the duration of social media use increased, the total ASHN score decreased and the participants whose social media use decreased in the last one month have the highest scores (Table 9). This result suggests that a healthy eating attitude may be effective in managing stress and new lifestyle habits induced by the pandemic.

Diet is affected by social, psychological and cultural issues, as well as mental or physical health. Some foods have been reported to increase stress responses and make individuals more susceptible to stress [27]. When stressed, women and moderate eaters consume foods high in calories and fat and shift their food preferences from meal-type foods, such as meat and vegetables, to snack foods. In contrast, men and unrestricted eaters have been reported to show little difference or reduction in food intake under stress [28].

The results of these studies suggest that it may be beneficial to encourage the consumption of healthier foods and to develop a healthy eating attitude within the scope of interventions to reduce depressive symptoms and

stress. The fact that those whose general well-being decreased in the last month and those whose future anxiety increased in the last month had the lowest ASHN scores in our study confirms that reasoning (Table 9).

Studies show that social isolation triggers many unhealthy eating behaviors [29]. This may be of particular concern for those with a history of eating disorders. The scarcity mindset may be a trigger to reinforce food stocking behavior and the overeating/restriction cycle.

Stress affects eating habits in many different ways, such as skipping meals or binge eating [29]. This is expected that such an attitude would affect not only body weight and mood, but also health as a whole. Various studies have indicated that the quarantine implemented in the COVID-19 process led to changes in body weight [1, 4]. Similarly, 38% of our participants reported an increase in their body weight in the last one month. In another study from our country, 35% of the participants stated that their body weight increased since the beginning of social isolation [30]. Batlle-Bayer et al. demonstrated that during the quarantine period, individuals consumed 539 more calories than they normally do, and their diets had lower nutritional quality [31].

Considering the relation of the changes in activity level with the total ASHN score, the total ASHN score of the participants who reported increased daily activity is found to be significantly higher than the other groups (unchanged/decreased) ($p = 0.012$).

When the relationship between the changes in daily sleep duration and the total ASHN score is analyzed, those who reported that their sleep duration did not change have higher ASHN scores than the others, but the difference is not significant ($p = 0.082$).

It has been reported that to cope with increased stress and anxiety during the quarantine process, individuals may turn to alcohol, substance and drug use for feeling good [2]. It has been suggested that as the process prolongs, mental symptoms may acquire a chronic character in connection with the increase in hopelessness, and this may lead to aggravation of symptoms in individuals with a history of mental disorder(s).

In some studies, it has been found that pandemic and quarantine stress caused an increase the smoking and alcohol use of individuals [20]. In our study, the majority of the participants did not smoke or drink alcohol. Also, it was determined that smoking and alcohol consumption status did not change respectively in 77.8% and 77.5% of the participants in the last one month. Similar to the study of Di Renzo et al. [17], in our study, it has been found out that the rates of smoking and alcohol use decreased by 16.2% and 18.3%, respectively. The fact that the majority of the participants had a high healthy eating attitude was effective in better management of their physical and mental health.

It has been determined that due to increased stress; individuals under quarantine have increased the consumption of foods/beverages high in sugar and fat [32]. A diet based on excessive consumption of simple carbohydrates can lead to metabolic syndrome, as well as dysregulation in immune responses [33]. Furthermore, it has been reported that high-fat diets leading to obesity may exacerbate inflammation or infection in the host and consequently increase mortality [34].

Various studies conducted in our country within the first months of the pandemic demonstrated increased consumption of cakes, cookies, chocolate, candy, and pastry foods in adults [35, 36]. In another study conducted in adults [37], the consumption frequency of meat, eggs, legumes, nuts, milk and milk products, fruits, vegetables, cereals, chocolate and sugary foods, junk food, and herbal tea was found to be significantly elevated compared to the pre-pandemic period.

In the study conducted by Cheikh Ismail et al. [16], it was reported that 48.8% of respondents did not consume fruit and 32.5% did not consume vegetables daily. However, 44.1% reported that they were consuming sweets or desserts at least once a day, and 32.9% reported that they ate salty snacks (chips, crackers and nuts).

In one of the first studies that investigating the effect of COVID-19 lockdown on eating behavior and lifestyle, adherence to the Mediterranean diet was examined and found to have a moderate level of adherence. The study found that while consumption of fruits, nuts and vegetables ranked highest in the Mediterranean diet, in contrast, there was little adherence to olive oil consumption [7].

In the present study, the food products, of which consumption increased the most, were eggs, dairy products, fresh vegetables and fruits, tea, coffee, water, olive oil and milk puddings. It has been observed that the increased

consumption of these foods complies with the recommendations of the Mediterranean diet. Unlike some other studies, the consumption of pastries, sweets, and junk foods was found less in our study; this is thought to be compatible with the high healthy eating attitudes of the participants.

One of the first studies to investigate eating habits and lifestyle changes among Italian residents reported an increase in intake of fruits, vegetables, nuts, legumes and fish, which showed better adherence to the Mediterranean diet [17]. It is similar to the findings of our study in terms of an increase in consumption of foods out of fish.

When we evaluated the use of dietary supplements of the participants in the last month in our study, the usage rates were as follows: 25.9% vitamin C; 19% multivitamin; 13.7% B complex vitamins; 28.7% vitamin D; 11.6% iron; 12% zinc; 10.9% omega-3; 12% propolis; 19% ginger and turmeric; and 11.1% probiotics. The proportion of women who used vitamin C ($p = 0.011$), iron ($p = 0.000$), zinc ($p = 0.000$) and vitamin D ($p = 0.000$) supplements was found to be significantly higher compared to men. In the same period, the rate of those using other nutritional supplements (such as echinacea, ginseng, beta glucan, dandelion, coenzyme Q10) was less than 10%.

In a study conducted in Spain by Pérez-Rodrigo et al. [38], 21.3% of participants stated that they consumed vitamin and mineral supplements during quarantine, and this consumption was found to be higher in women and people aged 35–54. Of the most commonly used supplements, 27% were multivitamins, combinations of minerals and trace elements, followed by 25.8% with varying doses of vitamin D and 22.2% with vitamin C. In addition, 10.9% of participants reported they they were consuming dietary supplements and herbal products. The most commonly consumed dietary supplements were brewer's yeast (16.8%), fiber (16.8%), omega-3 polyunsaturated fatty acids (15.9%), and probiotics (12.4%). In this study, the types and rates of supplements used by individuals in the quarantine process and their increased use in women were found to be similar to our results.

In a study carried out in adults from our country [37], it was determined that the most preferred vitamin for protection from COVID-19 is vitamin D (10%) and the most preferred mineral is zinc (4.8%). In another study [39], which was conducted during the pandemic period and involved a total of 341 individuals aged between 18 and 65 years of age, approximately one-third of the participants reported that they started using nutritional supplements, mainly vitamin D (56.9%), vitamin C (50.4%) and zinc (27.6%).

In a study conducted to reveal opinions about the dietary supplements [40], the main reasons for the participants to use dietary supplements were to strengthen immune system, prevent fatigue, and improve physical and mental performance. In that study, the rate of the use of vitamins C, B, D and calcium was high, but the awareness about and the use of glucosamine was extremely low.

A research conducted in Ankara on the use of dietary supplements demonstrated that the use of vitamins is higher in women while the use of sports products is higher in men. When asked about the purpose of using dietary supplements, the top three ranks were wellness, increased performance and enhanced immunity in men versus increased immunity, wellness and delayed aging in women [41].

When the relationship between using various dietary supplements and the total ASHN score was examined, a significant correlation was found between the use of omega-3, probiotic, vitamin D and ginger/turmeric supplements and the total ASHN scores (Table 8). While those who never used omega-3 have the lowest total ASHN scores, the scores of participants who used omega-3 in the past and in the last month are the highest ($p = 0.004$). Similarly, as the frequency of the use of probiotics increases, the total ASHN score elevates. Participants who used probiotics in the past and in the last one month have the highest total ASHN scores ($p = 0.036$). The total ASHN score of those who used vitamin D, which is an important vitamin in the protection of immunity, in the past and in the last 1 month is the highest compared to the others with different frequencies of use ($p = 0.000$). The total ASHN scores of those who never used dietary supplements containing ginger/turmeric supplements are the lowest, while those who used such supplements in the last month have the highest scores ($p = 0.008$). These results demonstrate that awareness about and positive attitude for healthy eating are effective not only in the balanced consumption of natural foods, but also in the selection of dietary supplements that have a role in strengthening immunity during the pandemic. A positive relationship was found between the use of dietary supplements and education level and nutritional quality in men and women from Spain [42].

In our study, the rate of the use of iron, zinc, vitamin C and D in the last one month was found to be significantly higher in women than in men. While this result may be attributed to the fact that the needs of women for some micronutrients are higher compared to men, it may also be interpreted as an attitude associated with healthy eating awareness as the attitude enhanced especially in the last one month.

5. Conclusion

To our knowledge this is one of the first comprehensive studies investigating the changes in people's diet and lifestyle habits at the beginning of the pandemic in Turkey. In this study, unlike the others, the effects of healthy eating attitudes on this change were also examined. Similar to previous studies, in our study, it was found that body weight increased in 38% of the participants; activity level decreased in 73.1%; sleep duration increased 44.7%; social media use intensified in 77.8% and concerns for future increased in 66.7% of the participants. Furthermore, the healthy eating attitudes of the majority of the participants are at high and ideal levels.

It has been revealed that the attitudes for healthy eating vary by age, gender, marital status and education level and that as the age and education level advance, the attitude for healthy nutrition enhances. It has been observed that those with a high attitude for healthy eating have had better eating and lifestyle habits and stress management during the pandemic. Nutrition is an important determinant for not only physical health, but also mental health. Therefore, we think that the development of a healthy eating attitude may be effective in protecting physical and mental health in case of epidemics.

5.1. Limitations of the study

The study is a cross-sectional study that was conducted online throughout Turkey at the end of the first month following the announcement of the pandemic. Data was collected based on the participants' self-reports. Since the chance of reaching the same participant again in online research is extremely low, it is almost impossible to make before-after comparisons by asking the same questions to the same people. For this reason, the participants evaluated their conditions at the time of the survey by making comparisons with the pre-pandemic period based on their own perceptions. Considering the fact that the perceptions of the participants may change over time, their answers to the survey are limited to their perceptions at the time of the survey. Another limitation of the study is that the individuals retrospectively evaluated their body weight and lifestyle changes, like all other questions in the survey, and their evaluation was based on the individuals' own statements. Furthermore, although the study aimed to reach out the people all over the country, the majority of participants reside in Istanbul and its surrounding cities. The percentages of those participating from other regions and cities are lower. The fact that a homogeneous distribution could not be achieved among the participants may be due to the online nature of the study, which could not be conducted otherwise due to pandemic conditions. As a result, it may be stated that the results of our study reflect a society with a higher sociocultural level. However, our study is valuable in that it is the first study to reveal the effect of attitudes towards healthy eating on various variables during the pandemic process.

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Conflict of interest

The authors do not have any conflict of interest in this study.

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