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RESEARCH / ARAŞTIRMA

Did Adults Experience Changes in Body Weight During the COVID-19 Pandemic?

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ABSTRACT

Objective: In pandemic periods, due to changes in individual food preferences and dietary habits, it is stated that healthy, adequate, and balanced nutrition should be among the risk management strategies for pandemics. Therefore, this research aims to reveal the dietary habits and body weight changes of healthy individuals during the COVID-19 pandemic.

Material and Methods: This cross-sectional study was performed on 419 healthy adults aged from 18 to 65 years who live in Kayseri. The data collection was obtained through Google Forms via the online survey social network (WhatsApp).

Results: The mean age of the participants was 32.91±12.80 years, and their body mass index (BMI) was 25.80±4.78 kg/m^2. During the pandemic period, the body weight of 55.1% of the participants changed, 71.4% of them increased and 28.6% decreased. When compared according to BMI groups, the increase in body weight among obese individuals (8.25±5.54 kg/m^2) was found to be statistically significantly higher than that of individuals with normal body weight (4.39±1.78 kg/m^2) ($p<0.001$).

Conclusion: As a result of this study, a significant increase in body weight among obese individuals during the pandemic period has been identified. Therefore, it is believed that implementing necessary regulations to prevent obesity in pre-pandemic periods by healthcare professionals would be beneficial.

Keywords: Nutrition, COVID-19, obesity, nutritional habits.

Yetişkinlerin COVID-19 Pandemi Döneminde Beden Ağırlığında Değişim Oldu mu?

ÖZET

Amaç: Pandemi dönemlerinde bireysel besin tercihleri ve beslenme alışkanlıklarında oluşan değişimler nedeniyle sağlıklı, yeterli ve dengeli beslenmenin pandemi risk yönetim stratejileri arasında yer alması gerektiği belirtilmektedir. Bu nedenle bu araştırmada; COVID-19 pandemi sürecinde sağlıklı bireylerin beslenme alışkanlıkları ve vücut ağırlığında meydana gelen değişimlerin ortaya konması amaçlanmıştır.

Gereç ve Yöntem: Bu kesitsel araştırma Kayseri ilinde yaşayan, yaşları 18-65 yaş arasında 419 sağlıklı yetişkin ile gerçekleştirilmiştir. Veri toplama, çevrimiçi anket sosyal paylaşım ağı (Whatsapp) üzerinden Google Forms aracılığı ile elde edilmiştir.

Bulgular: Katılımcıların yaş ortalaması 32,91 ±12,80 yıl olup, çoğu 18-35 yaş grubu (%62,8) arasındadır. Katılımcıların %59,9'u erkek, %40,1'i kadın, ortalama beden kütle indeksi (BKİ) 25,80±4,78 kg/m^2 olup, %43,4'ü normal vücut ağırlığında, %34,6'sı hafif şişmandır. Pandemi sürecinde katılımcıların %55,1'inde vücut ağırlığı değişiklikleri meydana gelmiştir. Bunların %71,4' ünün vücut ağırlığı artmış, %28,6'sı azalmıştır. Gruplar BKİ sınıflandırılmasına göre karşılaştırıldığında; obezlerin vücut ağırlığında görülen artışın (8,25±5,54 kg/m^2), normal vücut ağırlığında olanlardan (4,39±1,78 kg/m^2) istatistiksel olarak anlamlı düzeyde daha yüksek olduğu saptanmıştır ($p<0,001$).

Sonuç: Bu çalışma sonucunda pandemi sürecinde obez bireylerin vücut ağırlığındaki anlamlı artış olduğu belirlenmiştir. Bu nedenle sağlık profesyonelleri tarafından pandemi öncesi dönemlerde obezitenin önlenmesi için gerekli düzenlemelerin yapılmasının yararlı olacağı düşünülmüştür.

Anahtar Kelimeler: Beslenme, COVID-19, obezite, beslenme alışkanlıkları.

1. Introduction

In March 2020, COVID-19 was declared as a global pandemic and public health threat (1). The first COVID-19 case in Türkiye was detected on March 11, 2020. During this period, there was an increase in the number of cases in Türkiye, as in the rest of the world. The entire society has become sensitive and concerned about the COVID-19 pandemic period (2). Strict hygiene rules and curfew were implemented in different countries in the world, where the first cases were confirmed (3). Such practices and measures, quarantines and concerns about providing hygienic conditions have had an impact on lifestyle, psychological factors, and dietary habits (4). Maintaining healthy, adequate, and balanced nutrition is a crucial element of

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personal risk management strategies during pandemics like COVID-19. During these periods, individual food preferences and eating habits tend to change (5). COVID-19 created individual concerns, physical distance, and isolation, along with travel restrictions, causing a decrease in the workforce in all economic sectors. These pandemic-related restrictions increased people's stress and altered their dietary habits (6-8). It has been emphasized that healthy eating habits are much more important to reduce the risk of COVID-19 susceptibility and complications, which have different effects according to age groups, gender and living conditions (9). It has been reported that the duration of staying at home, delicious cooking, and the number of meals, alcohol, and cigarette consumption increased during the COVID-19 period (10). It has also been stated that long time spent at home during the pandemic is associated with increased sedentary behavior (relative to average time) throughout the day (11). This sedentary shift is accompanied by diminished levels of physical activity, particularly post-dinner, as well as a reduction in the consumption of fruits and vegetables (12). Liquid intake has decreased, while the consumption of sugary drinks and snacks has increased, along with a rise in appetite (13). Emotional eating factors have experienced an uptick, and the quality of sleep has seen a decline, contributing to an augmentation in body weight and an elevated risk of obesity (14). In this study aims to reveal the dietary habits of healthy individuals and the changes in body weight during the COVID-19 pandemic.

2. Materials and Methods

2.1. Experimental Design and Sample Selection

This cross-sectional study was performed on 419 healthy adult participants living in Kayseri province between February 2020 and April 2020. In the calculation of the sample size, the work of Sidor et al. (10) was taken as a reference. In the power analysis based on this ratio, under the condition that the Alpha was 0.05 and the power was 0.95, the minimum sample size was calculated as 374 people assuming that the study population would deviate by 10% from the data of the reference study population. Post power analysis of the study was calculated using the average weight gain of the group during the pandemic period. It was determined that the post power analysis required 324 people under the condition that the effect size was 0.156, the power was 0.8 and the alpha value was 0.05. The present study concluded with 419 participants, considering possible data losses. This study was conducted according to the guidelines laid down by the Declaration of Helsinki and all procedures involving human subjects. The approval were followed from The Ministry of Health, General Directorate of Health Services on 31.01.2021 for this study. Ethics Committee Approval with the decision number '1/713' and dated as 'February 2021' was obtained from the Ethics Committee of Nuh Naci Yazgan University, and the participants were allowed to read the informed consent form before starting the survey.

2.2. Data Collection

This cross-sectional study, which was planned to investigate the changes in nutritional habits and body weight during the pandemic period, was performed on the relatives of 4th grade students studying at Nuh Naci Yazgan University, Department of Nutrition and Dietetics. The sample selection was collected by the snowball method. The criteria to be included in the study were between being the ages between 18 and 65, having a telephone to receive the online survey, being able to answer the survey questions, being without COVID-19 diagnosis and also accepting to participate in the study and to approve the consent form. The exclusion criteria were being under the age of 18, over the age of 65, having been diagnosed with COVID-19 and not having a phone to receive the online survey.

2.2.1. Application of online survey

An online questionnaire (63-questions) consisting of the socio-demographic characteristics of the participants, their nutritional habits, chronic diseases and the drugs they use, smoking and alcohol use, changes in body weight and eating habits during the pandemic period was applied via Google Forms on the social network (WhatsApp). The dietary habits and changes in body weight of the participants were grouped as before and after the pandemic. According to the 28th-and 32th questions of the questionnaire, the participant were divided into two groups as those who take care of healthy nutrition and those who do not, and the differences in the eating habits of the groups were examined. Changes in the consumptıon of fruits, vegetables, meat, nuts, spices, herbal teas, coffee, carbonated-acidic beverages, and kefir were investigated during the pandemic period (4,10). Body weight and height measurements of individuals were recorded according to their self reported measurements. Body Mass Index (BMI) was calculated using the weight ((kg)/height² (m²)) formula. According to World Health Organization (WHO) adult BMI classification, participants with BMI below 18.5 kg/m^2 were classified as underweight, those with 18.5-24.9 kg/m^2 as normal, those with 25.0-29.9 kg/m^2 as overweight, and those above 30 kg/m^2 as obesity. Compared to the pre-pandemic period, body weight and BMI of the participants were grouped as increased, decreased or unchanged (15).

2.3. Statistical Analysis

The SPSS 22.0 (Statistical Package for Social Sciences Statistics) program was used for statistical analysis of the data obtained in the study. Descriptive findings were expressed as numbers and percentages. Chi-square test was used to determine the difference between categorical variables and McNemar-Bowker test was used to compare dependent measures with more than two nominal categories. The normality of the data distribution was determined using the Shapiro-Wilk test. The significance level in the study was accepted as $p<0.05$.

2.4. Ethical Aspect of the Research

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects. Approval was obtained from The Ministry of Health, General Directorate of Health Services on 31.01.2021 for this study. Ethics Committee Approval with the decision number '1/713' dated as 'February 2021' was obtained from the Ethics Committee of Nuh Naci Yazgan University, and the participants were allowed to read the informed consent form before starting the survey.

3. Results

3.1. Participants

Four hundred and nineteen healthy adult who were not diagnosed with COVID-19 during the pandemic period were included in this study. The mean age of the participants was 32.91±12.80 years, most of them were between the ages of 18 and 35 (62.8%) and 59.9% of them were men and 40.1% of them were women. Due to the pandemic period, the rate of flexible and shift employees was higher (53.2%). Most of the participants were single (54.9%), have a good family income according to their own statement (59.7%) lived in the city (84.7%), and had family members of mostly were 4 or more (68.7%). Among the participants, the rates of those who had chronic diseases (16%) and those who used alcohol (6.4%) were low (Table 1). During the pandemic period, the sleep duration of 47.7% of the participants did not change compared to the pre-pandemic period, while the physical activity level of 48.8% of the participants decreased (Table 1).

Table 1. Some sociodemographic characteristics of the participants

Characteristics	Frequency	%
Women	168	40.1
Men	251	59.9
Age (years) (x̄ ± SS)	32.91±12.80	
18-35 years	263	62.8
36-50 years	97	23.1
51-65 years	59	14.1
Marital Status		
Married	189	45.1
Single	230	54.9
Working Status		
Unemployed	32	7.7
Working From Home	24	5.7
Regular and Workplace Work, Active Work	140	33.4
Flexible and Rotational Working	223	53.2
Number of Family Members		
≤ 3	131	31.3
≥ 4	288	68.7
Family Income Level		
Good	250	59.7
Middle	163	38.9
Bad	6	1.4
Place of Residence		
City	355	84.7
District	64	15.3
General Health Status During the Pandemic Period (declaration-based)		
High	94	22.4
Moderate	309	73.8
Low	16	3.8
Status of Person with COVID-19 Positivity at Home		
No	419	100.0
Yes	67	16.0
Chronic Disease		
None	352	84.0
Smoking Status		
Yes	127	30.3
No	292	69.7
Cigarette (Daily amount) (x̄ ± SS)	13.78±7.40	
Alcoholic Beverage		
Yes	27	6.4
No	392	93.6
Change in Sleep Time the Pandemic		
No Change	200	47.7
Increase	131	31.3
Decrease	88	21.0
Physical Activity Change Before and After the Pandemic		
No change	38	30.4
Increase	26	20.8
Decrease	61	48.8
Taking Care of Healthy Eating Compared To other times during before The Pandemic Period		
Yes	299	71.4
No	120	28.6
Body Weight Change During the Pandemic Period		
Yes	230	55.1
No	189	45.9

Of these, 71.4% had an increased body weight and 28.6% had a decreased body weight (Table 2). Considering the BMI groups, the increase in body weight observed in individuals during the pandemic period was compared, and the increase in body weight of the obese participants (8.25±5.54 kg/m^2) was significantly higher than that of those with normal body weight (4.39±1.78 kg/m^2) (p<0.001) (Figure 1).

Table 2. Body weight changes and BMI classification of participants during the pandemic (n=231)

Body Weight and BMI		
Before Pandemic BMI (kg/m^2) (x̄ ± SS)	25.80±4.78	
Increase in BMI (kg/m^2) (x̄ ± SS)	2.08± 1.30	
Decrease in BMI (kg/m^2) (x̄ ± SS)	2.13± 1.54	
Body Weight Gain (kg) (x̄ ± SS)	5.84±3.74	
Body Weight Loss (kg) (x̄ ± SS)	6.19±4.71	
People With Changing Body Weight (N=231)	**n**	**%**
Body Weight Gain	165	71.4
Body Weight Loss	66	28.6
BMI Status (kg/m^2)		
Underweight (<18.5)	14	3.4
Normal Weight (18.5-24.9)	182	43.4
Overweight (25-29.9)	145	34.6
Obese (≥30)	78	18.6

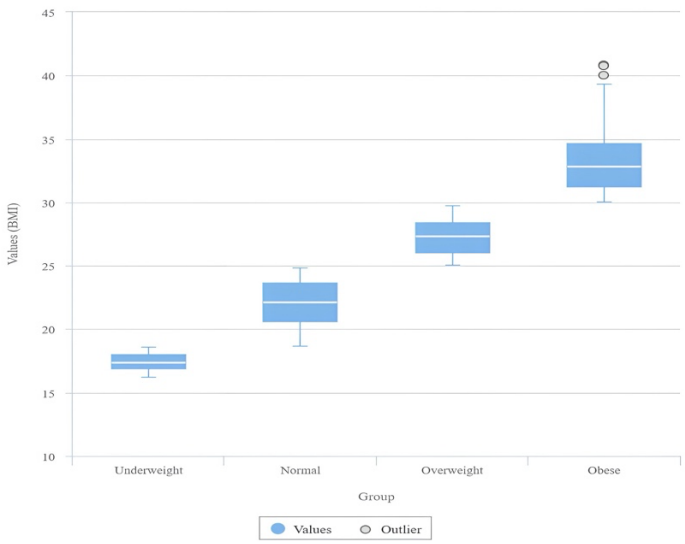


Figure 1. Comparison of increases in body weight during the pandemic period according to BMI classification

The main meals and snack preferences of the participants, the use of nutritional supplements and the frequency of eating out of the home during the pandemic were given in Table 3. There was no significant difference between the number of main meals of individuals before and during the pandemic (p>0.05). The rate of those who consumed 3 or more snacks during the pandemic period (19.1%) significantly increased than the pre-pandemic period (7.9%) (p<0.001). In addition, while 25.5% of the participants 'never' consumed snacks before the pandemic, 4.3% of them started to consume snacks (p<0.001). (Table 3). The 40.8% of the individuals did not prefer to 'never' eat outside the home during the pandemic period, and it was determined that this rate increased significantly compared to the pre-pandemic (6.4%) (p<0.001). In addition, the frequency of eating outside the home decreased during the pandemic period (p<0.001) (Table 3).

Table 3. Changes in some nutritional habits of the participants compared to pre-pandemic

Nutrition Habits		Before the Pandemic		During the Pandemic			
		n	%	n	%	x²*	p
Main Meals	1	12	2.9	9	2.1	1.38	0.710
	2	222	53.0	217	51.8		
	3	185	44.1	193	46.1		
Snacks	None	107	25.5	89	21.2	54.20	<0.001
	1	140	33.4	122	29.2		
	2	139	33.2	128	30.5		
	3 or more	33	7.9	80	19.1		
Vitamin-Mineral Use	Yes	101	24.1	167	39.9	134.66	<0.001
	No	318	75.9	252	60.1		
Use of Herbal Supplements	Yes	56	13.4	90	21.5	215.28	<0.001
	No	363	86.6	329	78.5		
Frequency of Eating Outside the Home	None	27	6.4	171	40.8	244.88	<0.001
	1 per month	110	26.3	146	34.8		
	1 per week	145	34.6	57	13.6		
	2-3 or more per week	137	32.7	45	10.8		
Frequency of Ordering Food from Outside	Every day	10	2.4	9	2.1	55.71	<0.001
	2-3 per week	100	23.9	66	15.8		
	1-2 per month	151	36.0	113	27.0		
	Less or none	158	37.7	231	55.1		

* McNemar-Bowker test was used for comparisons in the form of nxm.

The foods that were not consumed before the pandemic and started to be consumed during the pandemic were fruits and vegetables (53.7%), other foods (22.5%), soft drinks (12.5%) and kefir (10%) (Figure 2).

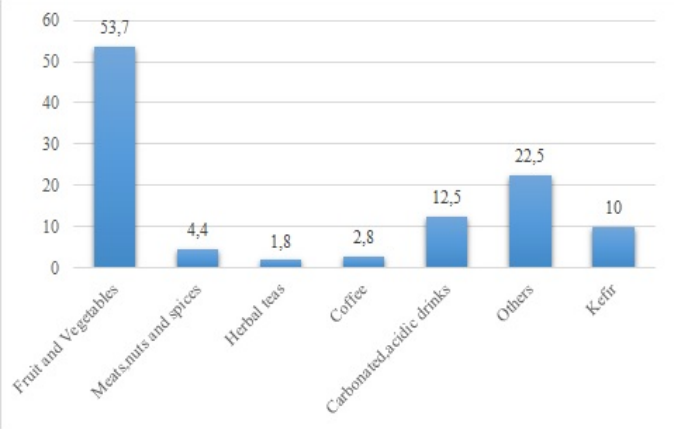
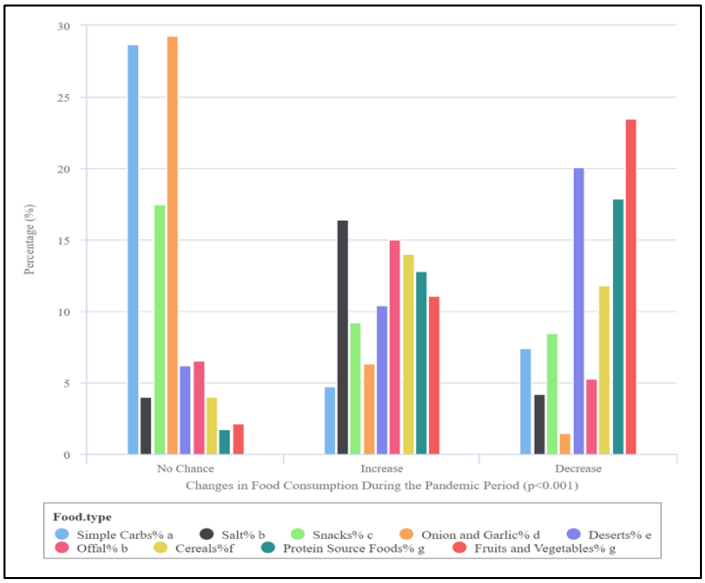


Figure 2. The five foods and beverages that were not consumed before the pandemic era and started to be consumed the most during the pandemic (%)

The increase in salt consumption (84.2%), fruit and vegetable consumption (38.40%) and sweet consumption (32.7%) during the pandemic took takes first three places. When the percentage distributions of changes in the consumption of some foods and food groups are examined, the percentage distributions of changes in salt and offal consumption, as well as the percentage distributions of changes in the consumption of vegetables-fruits and protein source foods, are similar among themselves (p>0.05), while for other binary food/food group comparisons, It was observed that the relevant percentages were different from each other (p<0.001) (Figure 3).

The changes observed in the food preferences of the participants who care about healthy nutrition and those who do not during the pandemic period were given in Table 4. There was a significant difference between those who pay attention to healthy nutrition during the pandemic period and those who did not concerning the consumption of sugar, salt, junk food snacks, sweets and cereals (rice, wheat, pasta) (p<0.05). Those who prioritized a healthy diet reduced their consumption of sugar (13%), snacks (16.4%), and sweets (16.4%) during the pandemic period more than those who did not (10%, 7.5%, 7.5%, respectively) (p<0.05) (Table 4).



* Chi-square Test, percentage distributions of different letters are statistically different from each other, p<0.05.

Figure 3. Changes in food consumption during the pandemic period

Table 4. Changes in some food preferences according to the status of paying attention to healthy eating during the pandemic period

Food name	Consumption Status	Those who care about healthy eating (n=299)		Those who don't care about healthy eating (n=120)		x^2	p
		n	%	n	%		
Sugar	No Change	200	66.9	67	55.8	9.35	0.009
	Increased	60	20.1	41	34.2		
	Decreased	39	13.0	12	10.0		
Salt	No Change	34	11.4	3	2.5	15.2	<0.001
	Increased	251	83.9	102	85.0		
	Decreased	14	4.7	15	12.5		
Junk Foods	No Change	118	39.5	45	37.5	7.10	0.029
	Increased	132	44.1	66	55.0		
	Decreased	49	16.4	9	7.5		
Onion-Garlic (Fresh/Dry)	No Change	194	64.9	79	65.8	0.78	0.677
	Increased	99	33.1	37	30.8		
	Decreased	6	2.0	4	3.3		
Dessert	No Change	164	54.8	60	50.0	10.2	0.006
	Increased	86	28.8	51	42.5		
	Decreased	49	16.4	9	7.5		
Giblets (Head, calves-foot etc.)	No Change	227	75.9	95	79.2	4.64	0.107
	Increased	31	10.4	5	4.2		
	Decreased	41	13.7	20	16.6		
Grain (rice, bulgur, pasta)	No Change	32	10.7	5	4.2	6.96	0.031
	Increased	216	72.2	85	70.8		
	Decreased	51	17.1	30	25.0		
Protein Source Foods (Meat, Fish, Eggs, Cheese, Legumes)	No Change	191	63.9	85	70.8	3.33	0.189
	Increased	98	32.8	29	24.2		
	Decreased	10	3.3	6	5.0		
Fruit and vegetable	No Change	159	53.2	79	65.8	7.27	0.260
	Increased	127	42.5	34	28.4		
	Decreased	13	4.3	7	5.8		
Daily Water Consumption Amount	No Change	227	75.9	91	75.8	0.07	0.964
	Increased	54	18.1	21	7.5		
	Decreased	18	6.0	8	6.7		
Daily Tea, Coffee, Herbal Tea Consumption Amount	No Change	226	75.6	81	67.5	3.33	0.189
	Increased	56	18.7	32	26.7		
	Decreased	17	5.7	24	5.8		

4. Discussion

This study was performed in order to determine the differences or similarities between the previous studies on the nutritional habits and body weight changes of healthy individuals during the COVID-19 pandemic period, and the findings were discussed in this direction. In the previous studies, it has been reported that changes in living conditions and stress factors, decrease in physical activity level, changes in nutritional habits and increase in the number of meals during the pandemic period caused changes in body weight (10,16). It has been stated that during the pandemic period, particularly overweight and obese individuals had been prefered unhealthy foods, so body weight gain and mental health are negatively affected (17-19). In another study conducted in Türkiye, similar to our findings, an increase in body weight was observed during the pandemic period, attributed to a higher incidence of emotional eating behaviors associated with increasing BMI (20). Similar to many previous studies (17-22), this study found an increase in unhealthy eating habits during the pandemic period, leading to a 71.4% increase in body weight gain. Especially the weight gain of obese individuals (8.25±5.54 kg) was found to be significantly higher ($p<0.001$) than the normal individuals (4.39 ±1.78 kg) (Figure 1). The mean BMI of the participants in this study was also 24.34±5.22 kg/m^2, and most of them (56%) were within the normal range according to the WHO classification. During the pandemic, the rate of participants who paid attention to healthy nutrition was higher (71.4%) compared to some other studies (17-45%). Additionally, it was determined that 55.1% of the participants had increased body weight (19). It was thought that this might be due to the increase in consumption of sweet, junk food and sugary foods.

In a study reviewing the causes of body weight gain at the global level during the pandemic period, it has been reported that being female gender, middle age, increased appetite, increased snacking after dinner, less physical activity, sedentary behaviors (≥6 hours/day), low water consumption and less sleeping times at night were among the predominant reasons (23). Contrary to the findings of Chew and Lopez (23) the mean age was 32.01±12.80 years and 59.9% of the group was male in this study. Most of the participants in this group stated that they worked flexibly and alternately during the pandemic (53.2%) and evaluated their general health status as 'good' (73.7%). In the literature, it has been reported that an increase in time spent at home, flexible working hours, and an increase in the frequency of eating together at home have resulted in a decrease in the frequency of eating out and an increase in body weight (24,25). Similarly, in this study, although there was no significant difference in the number of main meals during the COVID-19 pandemic period, an increase in snack consumption was observed. A notable decrease in the frequency of eating out and ordering food from outside the home among participants suggests that spending more time at home and increasing the number of meals and snacks consumed at home may lead to an increase in body weight. In a recent and large-scale cohort study conducted during the COVID-19 pandemic, it has been reported that the diet, which is defined as a healthy nutrition model with more plant-based foods, is associated with a lower risk and severity of COVID-19. Additionally, it has been suggested that poor metabolic health and unhealthy lifestyle behaviors are associated with a higher risk and severity of COVID-19 (26). In this study, the most of the participants did not consume any fruit and vegetables before the pandemic, they started to consume them during the pandemic (53.6%). This result may suggest that they tried to have an adequate and balanced diet as a result of the concern of the COVID-19 pandemic. Moreover, the statistically significant increase in the use of vitamins, minerals (39.9%) and herbal supplements (21.5%) in the pandemic period

in the most of the participants may indicate that many individuals cannot meet their nutritional needs, and this reason, it may be due to the increase in the use of nutritional support and the number of individuals who care about healthy nutrition is higher than those who do not.

The strength of our study is that it examined changes in body weight among healthy individuals who did not experience COVID-19 and found significant differences. Thus, our result data reflected the effects of the COVID-19 pandemic on the general population and is different from the data of many studies published in the literature on nutritional habits and body weight changes in individuals with COVID-19 pandemic. The limitation of our study is that the data was collected online due to the conditions of the COVID-19 pandemic. The more effective use of online survey applications by young individuals in society is also reflected in our study results. The participation of older individuals in the study may not have been adequately reflected in terms of changes in body weight and dietary habits due to the greater participation of younger adults with internet access. Another limitation of our study is that weight and height information was based on participants' self-reports. Therefore, BMI may not fully reflect reality. Additionally, to prevent potential data loss due to the increasing duration of online survey applications, data on queried dietary habits and food consumption frequency were limited. Consistent with the literature, changes in the consumption of food groups and specific foods during the COVID-19 pandemic were investigated, which relatively restricted the data on dietary diversity.

5. Conclusion and Recommendations

Although the impact of the COVID-19 pandemic has recently diminished, observations on dietary habits, lifestyle changes, and body weight fluctuations continue. The results of this study emphasize the importance of adequate and balanced nutrition during the pandemic in combating COVID-19. It is also suggested that obesity and weight gain may adversely affect pandemic management. Therefore, for public health purposes and to be prepared for pandemic periods, it is recommended to provide education on healthy living to all sectors of society.

6. Contribution to the Field

Obesity poses a major obstacle to many health problems and other diseases and their possible treatments. The pandemic represents a significant global problem full of unknowns. The importance of nutrition in the pandemic has been understood once again. In addition, due to the significant increase in body weight in obese people during the pandemic period, the importance of preventing obesity before such periods has been demonstrated once again.

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Authorship Contribution

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