

The Effect of Nutrition and Sleep Habits and Physical Activity Status on the Weight of University Students During COVID-19 Quarantine: Cross-Sectional Study

Üniversite Öğrencilerinin COVID-19 Karantinasındaki Beslenme ve Uyku Alışkanlıkları ile Fiziksel Aktivite Durumlarının Ağırlıklarına Etkisi: Kesitsel Çalışma

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ABSTRACT Objective: This study was executed to examine the effect of weight changes based on the nutritional and sleeping habits and physical activity status of “students of the department of nutrition and dietetics” and “students of the department of physiotherapy and rehabilitation” during coronavirus disease-2019 quarantine. **Material and Methods:** 50 students from each department were included in cross-sectional study the study. Their demographic characteristics, height, weight, sleep and physical activity habits, food consumption habits were questioned through survey. **Results:** In quarantine, 0.95 kg weight gain was observed in students whose mean age was 21.26±1.2 years. It was found that the weights increased by 2.45 kg with sleep less than 6 hours, and 1.18 kg with sleep above 10 hours. Weights increased with longer sitting time per day and weights decreased with less sitting time. It was found that the average weight during quarantine increased by 2.51 kg in those who lacked physical activity, and this was associated with appetite level, and the total number of meals per day. Consumption of pastries and desserts increased by 50%, and of milk, homemade yoghurt, cheese, eggs, black tea, and coffee by 40-67%, and these increases resulted in weight gain. Weight gains were observed in those who did not pay attention to their energy intake, and in 34-45% of those whose social media use and anxiety increased. **Conclusion:** In most of the students, in addition to eating more, adverse changes in sleep, stress, and physical activity led to weight gains.

Keywords: COVID-19; feeding behavior; sleep; physical activity; body weight

ÖZET Amaç: Bu çalışma, “beslenme ve diyetetik bölümü öğrencileri ile” “fizyoterapi ve rehabilitasyon bölümü öğrencilerinin” koronavirus hastalığı-2019 karantinasındaki beslenme ve uyku alışkanlıkları ile fiziksel aktivite durumlarına göre ağırlık değişimlerinin etkisi incelenmek amacıyla yapıldı. **Gereç ve Yöntemler:** Kesitsel tipteki çalışmaya her bölümden 50 öğrenci dâhil edildi. Anketle demografik özellikleri, boy, ağırlık, uyku ve fiziksel aktivite alışkanlıkları, besin tüketimleri sorgulandı. **Bulgular:** Yaş ortalamaları 21,26±1,2 yıl olan öğrencilerde karantınada, 0,95 kg ağırlık artışı saptandı. Uyku süreleri 6 saatin altındaysa 2,45 ve 10 saatin üzerindeyse 1,18 kg ağırlığın arttığı bulundu. Günlük oturma süresi uzadıkça ağırlıkların arttığı, kısaltıkça azaldığı görüldü. Karantınada, fiziksel aktivite yapmayanlarda ortalama ağırlığın 2,51 kg arttığı ve bu artışın fiziksel aktivite, iştah düzeyi, günlük toplam öğün sayısı ile ilişkili olduğu bulundu. Tüketimi artan besinlerin %50 oranında hamur işleri ve tatlı; %40-67 oranıyla süt, ev yapımı yoğurt, peynir, yumurta, siyah çay, kahve olduğu ve ağırlık artışları oluşturduğu saptandı. Aldığı enerjiye dikkat etmeyenlerde, sosyal medya kullanımı ve endişesi artanların %34-45’inde ağırlık artışları saptandı. **Sonuç:** Öğrencilerin önemli bir oranının, daha fazla yemeye vücut ağırlıklarının arttığı; olumsuz yönde etkilenen uyku, stres ve fiziksel aktivite değişikliklerinin, ağırlık artışlarına neden olduğu saptandı.

Anahtar Kelimeler: COVID-19; beslenme davranışı; uyku; fiziksel aktivite; vücut ağırlığı

Coronavirus disease-2019 (COVID-19) has been declared as a global pandemic by the World Health Organization (WHO).¹ The existence of the new epidemic was announced to the world on 31.12.2019.² Cases around the world were reported in early March

2020.³ The first case in Türkiye was seen on March 11, 2020, and soon spread throughout the country.⁴ COVID-19 adversely affects the body’s immune system.⁵ In infectious diseases, it is thought that, along with consuming apples and coriander to remove

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heavy metals from the body, consumption of food supplements such as micronutrients, probiotics, and omega 3, and also water, unprocessed foods, vegetables with high chlorophyll content, fruits, carotene, zinc, beta glucan fiber foods, eggs will strengthen immunity.^{1,6,7} To fight COVID-19, it is recommended to increase physical activity with optimal nutrition for the protection of physical and mental health.¹ It has been reported that being confined at home can cause eating irregularly and also obesity. Fears, increased anxiety, and worries experienced due to the epidemic can cause changes in diet. It has been found that these negative emotional states increase the desire to eat.⁸ The aim of this study was to determine the effect of nutritional attitudes and behaviors, sleep habits, and physical activity on the weights of “students of the department of nutrition and dietetics (SDND)” and “students of the department of physiotherapy and rehabilitation (SDPR)” in quarantine and the counter-relationship of the food consumed in such cases during the COVID-19 epidemic.

MATERIAL AND METHODS

PLACE, TIME, AND SAMPLING OF THE STUDY

This cross-sectional study was conducted on 100 students at a foundation university, 50 from SDND and 50 from SDPR, in the province of İstanbul between May and July 2020. The standard effect size was determined as 0.4 with 5% margin of error and 80% power for the sample size. It was found sufficient to include n=48 cases in each group. According to this minimum number, 50 people were included in each group. The reason for choosing these two groups is that their level of knowledge will affect the quality of life and this effect may cause behavioral changes. This situation was considered as awareness according to the academic program.

Informed consent was obtained from all individual participants included in the study. The study was conducted with pre-approval of the İstanbul Medipol University’s Non-Invasive Clinical Research Ethics Committee (no: 10840098-604.01.01-E.16397; dated June 10, 2020) and was performed in accord with the ethical standards of the 1964 Declaration of Helsinki and its latter amendments.

COLLECTION OF DATA

The data were collected from students who voluntarily agreed to participate in the study through an electronic survey titled “Changes on the Nutrition Habits in the COVID-19 Outbreak” (https://docs.google.com/forms/d/e/1FAIpQLSet8LFe15Mws—h-7LS7_3POaBrbRnIzb7R_I0TJlqI-raveAg/viewform?usp=sf_link). Survey consisted of 4 sections with 43 questions about physical activity and sleep habits along with dietary and food consumption habits and demographic information (Appendix 1). Physical activity was evaluated in 4 categories as resistance, aerobic, endurance, balance, flexibility.⁹

DATA EVALUATION

In the study, IBM SPSS Statistics 21.0 (SPSS IBM, Türkiye) for statistical analysis software was used. Data from demographic information, nutritional habits, sleep conditions, physical activity levels were summarized with the use of frequency, average, standard deviation, ratio, lowest and highest value, median and percentage statistics. Normality test was evaluated to determine the hypothesis tests. Kolmogorov-Smirnov and Shapiro-Wilk tests were applied to determine the normal distribution. If the significance level was greater than 0.05 according to the result of the test, it was interpreted as having a normal distribution and an independent t-test was applied to compare the two independent groups. Mann-Whitney U presentation was made for the data that did not show normal distribution. Similarly, when there are more than two groups, the analysis of variance test was applied for data showing normal distribution, while the Kruskal-Wallis test was applied when there were more than two groups.

RESULTS

Characteristics of the students are shown in Table 1. Less or more time spent sleeping, sitting and physical activity in quarantine was found to be associated with weight gain (Table 2).

It was found that foods whose consumption frequency increased (milk, coffee, water) (Table 3) and foods whose consumption frequency did not change (kefir, tarhana, red and white meat, processed meat,

APPENDIX 1: Survey form.**Nutritional habits of nutrition and dietetics and physiotherapy and rehabilitation students in the covid-19 global epidemic**

1. Your age:.....

2. Your gender:.....

3. Height Length (cm):

4. Weight (kg) (before quarantine):.....

5. Weight (kg) (after quarantine):.....

6. Your department:

Nutrition and Dietetics

Physiotherapy

7. Who do you spend the quarantine period with:

Alone

Family

Friend

Other:.....

8. Which day of the call to stay at home (quarantine) due to Covid 19 are you on?:.....

9. Do you have a health problem diagnosed by a doctor?

Yes

No

10. If yes, what is it?.....

11. Do you think dieting during the epidemic will weaken your immune system?:

Yes

No

12. Was there a diet program you followed before the Covid-19 outbreak? :

Yes

No

13. If your answer is yes, which diet program did you follow?

Mediterranean Diet

Gluten Free Diet

Intermittent Fasting

Ketogenic Diet

Vegetarian Diet

Vegan Diet

Hollywood Diet

Swedish Diet

Karatay Diet

Dukan Diet

Disease-Specific Diet (DM, Low Lipid-Arm Diet, Bariatric Surgery Diet, etc.)

Other:.....

14. Who recommended your diet before the Covid-19 outbreak? (This question will be marked by those who have followed a diet program before. You can mark more than one.)

My dietitian

My doctor

My coach

My circle of friends

Written, visual and social media

Other:

15. Were you able to continue your diet that you started before in the process of staying at home after the Covid-19 outbreak? (This question will be marked by those who have followed a diet program before.)

Yes

No

APPENDIX 1: Survey form (continued).**Nutritional habits of nutrition and dietetics and physiotherapy and rehabilitation students in the covid-19 global epidemic**

16. Have you had a change in your routine eating habits during the stay at home after the Covid-19 outbreak?

Yes

No

17. I started to pay attention to the calories I take in order not to gain weight.

Yes

No

18. I started to wonder and research how many calories are in the foods I eat.

Yes

No

19. I started getting support from a dietitian

Yes

No

20. In this process, I stopped dieting because I believed that it would lower my body resistance and weaken my immune system.

Yes

No

I was not dieting before

21. In this process, I started to eat more because I believed that it would increase my body resistance and strengthen my immune system.

Yes

No

22. I started researching healthy food choices on the internet.

Yes

No

23. I started to implement the nutritional recommendations shared on personal pages on the Internet.

Yes

No

24. I started to cook and eat new recipes that I learned from the internet.

Yes

No

25. Due to the epidemic, I started to use support products such as vitamins and minerals.

Yes

No

26. Have you decided to change your diet due to the Covid-19 epidemic process?

Yes

No

27. If your answer is yes, which type of diet did you start to apply?

Mediterranean Diet

Gluten Free Diet

Intermittent Fasting

Ketogenic Diet

Vegetarian Diet

Vegan Diet

Hollywood Diet

Swedish Diet

Karatay Diet

Dukan Diet

Other:

28. If your answer is yes, do you intend to continue the healthy eating habits?

Yes

No

APPENDIX 1: Survey form (continued).**Nutritional habits of nutrition and dietetics and physiotherapy and rehabilitation students in the covid-19 global epidemic**

29. What kind of changes have occurred in your life regarding the following situations compared to pre-quarantine?

Situations	It increased	Decreased	Hasn't changed
Your body weight			
Your activity level			
Your appetite			
Your total number of meals per day			
Your main meal consumption			
Your snack consumption			
Your meal time schedule			
Your cigarette consumption			
Your consumption of packaged ready-made products			
Your use of nutritional supplements			
Your tendency to eat at night			
Your junk food consumption			
Your general well-being			
Your concern for the future			
Your social media usage time			
Your activity level			
Your appetite			

30. How has your consumption of the following foods changed during the quarantine period?

Foods	It increased	Decreased	Hasn't changed
Milk			
Yogurt (ready)			
Yogurt (homemade)			
Cheese			
Kefir			
Tarhana			
Egg			
Red meat			
Processed meat (sausage, sausage, bacon etc.)			
Offal			
White meat			
The fish			
Dry beans			
Vegetables			
Fruits			
Oilseeds (almonds, walnuts, hazelnuts, etc.)			
Carbohydrate-heavy meals (pasta, rice, etc.)			
White bread			
Whole grain breads			
Homemade bread			
Spices consumption (turmeric, ginger, black pepper, etc.)			
Packaged products consumption (chocolate, chips, crackers, biscuits etc.)			
Pastries (cakes, pies, pastry, donut, etc.)			
Dessert consumption (sugar, Turkish delight, milk desserts, honey, molasses, jams, etc)			
Herbal teas			
Carbonated sugar drinks			
Black tea			
Types of coffee			
Water			

APPENDIX 1: Survey form (continued).**Nutritional habits of nutrition and dietetics and physiotherapy and rehabilitation students in the covid-19 global epidemic**

31. How many hours a day do you sleep?

- Less than 6 hours
- 7-9 hours
- 10 hours or more

32. There has been a change in your sleep quality after the Covid-19 outbreak.

- Yes
- No

33. After the Covid-19 outbreak, my tendency to immune-boosting products (turmeric, ginger, probiotic, propolis) increased.

- Yes
- No

34. If your tendency to immune-boosting products has increased after the Covid-19 outbreak, which ones did it increase? (This question will be answered by those who answered yes to the previous question.)

35. How many months did you breastfeed?.....

36. Have you started to consume a food that you have not consumed before after the Covid-19 outbreak?

- Yes
- No

37. If you started consuming a food that you have not consumed before after the Covid-19 epidemic, what are these

38. Has the person who prepared the meals / meals you consumed changed after the Covid-19 outbreak?

- Yes
- No

39. How many hours a day do you spend sitting? (Tv, Computer, Sitting study)

- Less than 3 hours
- 4-8 hours
- 8 hours or more

40. Do you do physical activity during the quarantine period?

- Yes
- No

41. What type of physical activity do you do? (Answer if your answer is yes.)

Your answer.....

42. How many days a week do you do physical activity? (Answer if yes)

- 1 or less
- 2-3 times
- 4-5 times
- 5 times or more

43. How long does your physical activity last? (Answer if yes)

- Less than 30 minutes
- 30-45 min
- 45 minutes and over

offal, fish, legumes, oily seeds, carbohydrate dishes, white bread, grain bread, spices, packaged products, herbal teas, carbonated sugary drinks) caused weight gain. These increases were found to be not statistically significant between the two groups, except for coffee ($p>0.05$).

No significant effects on weight gain were found caused by the type of diet practiced in COVID-19 quarantine, dietitian support, giving up the diet because it was believed to decrease body resistance and weaken the immune system, searching for healthy food options on the internet, and starting to cook and

TABLE 1: Characteristics of the students at baseline.

Characteristics	SDND (n=50)	SDPR (n=50)	General (n=100)
Age (years) [†] , *	21.52±2.2 (18-33)	21.00±1.75 (18-25)	21.26±1.2 (18-33)
Gender*			
Male	22	24	46
Female	28	26	54
Height (cm) [†] , *	170.44±9.30 (146-185)	171.60±8.88 (154-193)*	171.02±9.06 (146-193)
Weight (kg) [†] , *			
Before quarantine	62.71±15.28 (44-96)	64.21±11.36 (45-88)	63.94±12.19 (36-96)
After quarantine	65.09±14.03 (37-105)	65.40±11.88 (48-94)	64.80±12.94 (37-105)
BMI (kg/m ²) [†] , *			
Before quarantine	21.62±3.16 (16.85-31.25)	22.00±2.66 (17.58-30.49)	21.70±2.99 (16.85-31.25)
After quarantine	22.06±3.42 (15.94-32.41)	22.01±2.67 (18.65-31.25)	22.03±3.04 (15.94-32.41)
Type of physical activity [‡]			
Resistance			31 (31)
Aerobic-endurance			10 (10)
Resistance-aerobics			12 (12)
Quarantine days [†]			33.27±15.25 (0-70)
Sitting time in a day [‡]			p=0.078; X ² =5.114
Less than 3 hours	1 (1)	5 (5)	
4-8 hours	24 (24)	29 (29)	
8 hours and above	25 (25)	16 (16)	
Doing physical activity [‡]			p=0.224; X ² =1.478
Yes	32 (32)	26 (26)	
No	18 (18)	24 (24)	
Number of days in physical activity per week			p=0.652; X ² =1.631
1 days or less	3 (3)	6 (6)	
2-3 days	29 (29)	26 (26)	
4-5 days	10 (10)	12 (12)	
5 days or more	8 (8)	6 (6)	
Time spent doing physical activity			p=0.532; X ² =1.262
Less than 30 minutes	9 (9)	10 (10)	
30-45 minutes	33 (33)	28 (28)	
45 minutes or more	8 (8)	12 (12)	

[†]mean±standard deviation (minimum-maximum); *p>0.05; [‡]n (%); SDND: Students of the department of nutrition and dietetics; SDPR: Students of the department of physiotherapy and rehabilitation; BMI: Body mass index.

eat new recipes learned from the internet (p>0.05). The effects of other lifestyle changes in quarantine on weight are shown in [Table 4](#).

The effects of dietary habits on body weight change were observed in quarantine. Smoking, meal-time layout, consumption of packaged ready-made products, nutritional supplements, and junk food consumption did not affect weight (p>0.05). Other habits are shown in [Table 5](#).

DISCUSSION

In our study, the effect of changing nutritional attitudes and behaviors, sleep habits, and physical activity status on body weight change of university students who were quarantined due to the COVID-19 outbreak was investigated. It was found that the average weight of the students with a mean age of 21.26±1.99 years and 33.27±15.25 days in quarantine increased by 0.95 kg and body mass index (BMI)

TABLE 2: Sleep, physical activity, and body weight changes.

Sleep-physical activity	Weight (kg)		p value
	Before quarantine [†]	After quarantine [†]	
Sleep time per day			
Less than 6 hours	68.33±12.56 (48-87)	70.78±13.83 (51-94)	p=0.069
7-9 hours	63.18±12.11 (36-96)	63.85±12.78 (37-105)	X ² =5.333
10 hours or more	64.94±12.57 (47-87)	66.12±13.08 (48-87)	
Change in sleep habits after COVID-19			
Yes	62.64±12.01 (36-88)	63.31±12.32 (37-94)	p=0.258
No	66.58±12.32 (48-96)	68.00±13.81 (45-105)	Z=-1.132
Sitting time in a day			
Less than 3 hours	69.00±8.85 (56-80)	67.33±9.58 (56-80)	p=0.025
4-8 hours	63.40±11.94 (36-88)	64.45±12.21 (37-88)	X ² =7.375
8 hours and above	63.90±12.99 (36-96)	65.02±14.44 (45-105)	
Doing physical activity			
Yes	62.81±11.92 (36-88)	63.28±12.52 (37-94)	p=0.011
No	65.44±12.53 (45-96)	66.95±13.36 (45-105)	Z=-2.528
Number of days in physical activity per week			
2-3 days	62.64±9.95 (47-82)	63.32±10.70 (50-85)	p=0.507
4-5 days	61.59±13.97 (36-87)	62.23±14.71 (37-94)	X ² =1.360
5 days or more	65.15±11.81 (50-88)	65.00±12.13 (50-88)	
Time spent doing physical activity			
Less than 30 minutes	60.07±6.59 (52-75)	59.93±6.86 (50-76)	p=0.278
30-45 minutes	59.68±10.84 (36-82)	60.00±10.89 (37-85)	X ² =2.557
45 minutes or more	68.79±14.05 (47-88)	70.00±14.97 (50-94)	

[†]mean±standard deviation (minimum-maximum).

increased by 0.33 units. The fact that these increases were less in SDPR (Table 1) was interpreted as awareness associated with the academic program.^{10,11}

It was found that their weight increased when their sitting time was prolonged and decreased (1.67 kg) when their sitting time was shortened ($p < 0.05$) (Table 2). It was seen that 53% of the students performed physical activity and 31% performed resistance exercises (Table 1) and it was reported in studies that especially resistance, aerobic, endurance, balance and flexibility exercises were recommended during the quarantine period.^{9,12-14} While a weight gain of 1.51 kg ($p < 0.05$) was observed in students who did not perform physical activity, a weight loss of 0.15 kg was found in those who performed physical activity for 5 days or more. In one study, it was found that those who exercised regularly lost 1.3 kg and those who did not exercise gained 0.9 kg. Our low weight loss may be related to the low level of ex-

ercise performed at home during the quarantine period spent under stress (Table 1, Table 2).¹⁵

It was seen that the rate of poor sleep quality associated with weight gain in the COVID-19 quarantine, which ranged from 55.1% to 71.6%, was comparable to our study.¹⁶⁻¹⁹ Short sleep duration (<6 hours) is known to increase the risk of obesity, which was also proven in our study with a weight gain of 2.45 kg.²⁰ Consistent with our study, each 1-hour decrease in sleep duration was found to increase obesity risk by 24% and BMI by 0.35 kg/m².²¹⁻²³ It has been reported that high secretion of the hormone ghrelin, which is associated with the feeling of hunger in the body, as a consequence of insufficient sleep may cause weight gain.²³ In order to prevent this, consumption of tryptophan-containing foods that synthesize serotonin and/or melatonin at dinner may relieve sleep problems.²⁴ In our study, it was found that the tendency towards such foods increased (Table 3).

TABLE 3: Food consumption frequencies and body weight changes.

Nutrients	Consumption	SDND			SDPR			Total			CCCRD							
		Weight ^{†,↑}	Weight ^{†,-}	Weight ^{†,↓}	Weight ^{†,↑}	Weight ^{†,-}	Weight ^{†,↓}	Weight ^{†,↑}	Weight ^{†,-}	Weight ^{†,↓}	p value	X ²	p value	X ²				
Yogurt (homemade)	↑	12 (24)	7 (14)	2 (4)	0.273	5.142	12 (24)	5 (10)	3 (6)	0.300	4.883	24 (24)	12 (12)	5 (5)	0.059	9.092	0.885	0.244
	↓	3 (6)	0 (0)	1 (2)			3 (6)	0 (0)	0 (0)			6 (6)	0 (0)	1 (1)				
	-	9 (18)	9 (18)	7 (14)			12 (24)	6 (12)	9 (18)			21 (21)	15 (15)	16 (16)				
Cheese	↑	10 (20)	6 (12)	1 (2)	0.088	8.105	18 (36)	2 (4)	3 (6)	0.020	11.652	28 (28)	8 (8)	4 (4)	0.026	11.024	0.462	1.543
	↓	0 (0)	2 (4)	0 (0)			1 (2)	0 (0)	1 (2)			1 (1)	2 (2)	1 (1)				
	-	14 (28)	8 (16)	9 (18)			8 (16)	9 (18)	8 (16)			22 (22)	17 (17)	17 (17)				
Kefir	↑	6 (12)	5 (10)	2 (4)	0.797	1.666	4 (8)	2 (4)	0 (0)	0.543	3.088	10 (10)	7 (7)	2 (2)	0.433	3.804	0.074	5.216
	↓	2 (4)	1 (2)	2 (4)			1 (2)	0 (0)	1 (2)			3 (3)	1 (1)	3 (3)				
	-	16 (32)	10 (20)	6 (12)			22 (44)	9 (18)	11 (22)			38 (38)	19 (19)	17 (17)				
Tahana	↑	10 (20)	5 (10)	2 (4)	0.553	3.027	5 (10)	2 (4)	3 (6)	0.872	1.234	15 (15)	7 (7)	5 (5)	0.616	2.664	0.280	2.544
	↓	1 (2)	0 (0)	1 (2)			2 (4)	0 (0)	1 (2)			3 (3)	0 (0)	2 (2)				
	-	13 (26)	11 (22)	7 (14)			20 (40)	9 (18)	8 (16)			33 (33)	20 (20)	15 (15)				
Egg	↑	12 (24)	9 (18)	5 (10)	0.918	0.170	19 (38)	5 (10)	8 (16)	0.476	3.512	31 (31)	14 (14)	13 (13)	0.787	1.720	0.245	2.816
	↓	0 (0)	0 (0)	0 (0)			1 (2)	0 (0)	0 (0)			1 (1)	0 (0)	0 (0)				
	-	12 (24)	7 (14)	5 (10)			7 (14)	6 (12)	4 (8)			19 (19)	13 (13)	9 (9)				
Vegetables	↑	18 (36)	9 (18)	6 (12)	0.667	2.374	19 (38)	6 (12)	8 (16)	0.719	2.090	37 (37)	15 (15)	14 (14)	0.510	3.290	0.348	2.110
	↓	2 (4)	1 (2)	1 (2)			1 (2)	0 (0)	0 (0)			3 (3)	1 (1)	1 (1)				
	-	4 (8)	6 (12)	3 (6)			7 (14)	5 (10)	4 (8)			11 (11)	11 (11)	7 (7)				
Fruits	↑	17 (34)	8 (16)	7 (14)	0.100	7.777	22 (44)	8 (16)	10 (20)	0.802	1.638	39 (39)	16 (16)	17 (17)	0.213	5.819	0.184	3.389
	↓	0 (0)	1 (2)	2 (4)			1 (2)	0 (0)	0 (0)			1 (1)	1 (1)	2 (2)				
	-	7 (14)	7 (14)	1 (2)			4 (8)	3 (6)	2 (4)			11 (11)	10 (10)	3 (3)				
Homemade bread	↑	15 (30)	13 (26)	4 (8)	0.144	6.855	15 (30)	6 (12)	5 (10)	0.385	4.158	30 (30)	19 (19)	9 (9)	0.312	4.771	0.473	1.496
	↓	0 (0)	1 (2)	1 (2)			3 (6)	0 (0)	0 (0)			3 (3)	1 (1)	1 (1)				
	-	9 (18)	2 (4)	5 (10)			9 (18)	5 (10)	7 (14)			18 (18)	7 (7)	12 (12)				
Pastries	↑	15 (30)	6 (12)	0 (0)	0.019	11.846	14 (28)	5 (10)	10 (20)	0.228	5.639	29 (29)	11 (11)	10 (10)	0.624	2.614	0.138	3.963
	↓	3 (6)	3 (6)	4 (8)			2 (4)	2 (4)	0 (0)			5 (5)	5 (5)	4 (4)				
	-	6 (12)	7 (14)	6 (12)			11 (22)	4 (8)	2 (4)			17 (17)	11 (11)	8 (8)				
Dessert	↑	16 (32)	7 (14)	2 (4)	0.146	6.823	14 (28)	4 (8)	7 (14)	0.736	2.001	30 (30)	11 (11)	9 (9)	0.495	3.387	0.820	0.397
	↓	2 (4)	3 (6)	3 (6)			4 (8)	1 (2)	1 (2)			6 (6)	4 (4)	4 (4)				
	-	6 (12)	6 (12)	5 (10)			9 (18)	6 (12)	4 (8)			15 (15)	12 (12)	9 (9)				
Black tea	↑	18 (36)	6 (12)	1 (2)	0.000	21.702	14 (28)	7 (14)	6 (12)	0.694	2.228	32 (32)	13 (13)	7 (7)	0.033	10.506	0.214	3.085
	↓	1 (2)	1 (2)	5 (10)			2 (4)	0 (0)	0 (0)			3 (3)	1 (1)	5 (5)				
	-	5 (10)	9 (18)	4 (8)			11 (22)	4 (8)	6 (12)			16 (16)	13 (13)	10 (10)				

†:n (%); SDND: Students of the department of nutrition and dietetics; SDPR: Students of the department of physiotherapy and rehabilitation; CCCR: Comparison of consumption changes regarding the departments; †: Increasing; ‡: Decreasing; -: Unchanged.

TABLE 4: Effect of lifestyle changes on body weight.

Lifestyle changes	SDND		SDPR		Total		CCCRD	
	Weight ^{†,‡}	Weight ^{†,‡}	Weight ^{†,‡}	Weight ^{†,‡}	Weight ^{†,‡}	Weight ^{†,‡}	Weight ^{†,‡}	Weight ^{†,‡}
	↑	↓	↑	↓	↑	↓	↑	↓
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
	p value	X ²	p value	X ²	p value	X ²	p value	X ²
Does dieting weaken the immune system during the epidemic?								
Yes	7 (14)	1 (2)	7 (14)	4 (8)	14 (14)	5 (5)	11 (11)	0.049
No	17 (34)	15 (30)	20 (40)	7 (14)	37 (37)	22 (22)	11 (11)	6.043
	0.042	6.363	0.336	2.181	0.049	6.043	0.383	0.762
Has there been a change in routine eating habits during the home stay during COVID-19?								
Yes	20 (40)	10 (20)	19 (38)	7 (14)	39 (39)	17 (17)	15 (15)	0.433
No	4 (8)	6 (12)	8 (16)	4 (8)	12 (12)	10 (10)	7 (7)	1.673
	0.228	2.960	0.837	0.357	0.433	1.673	0.826	0.049
I started to pay attention to the weight I gained in order not to gain weight.								
Yes	12 (24)	11 (22)	3 (6)	6 (12)	15 (15)	17 (17)	11 (11)	0.013
No	12 (24)	5 (10)	24 (48)	5 (10)	36 (36)	10 (10)	11 (11)	8.672
	0.495	1.406	0.012	8.777	0.013	8.672	0.002	9.180
I started to wonder and analyze the calories of the foods I eat.								
Yes	10 (20)	6 (12)	5 (10)	3 (6)	15 (15)	9 (9)	7 (7)	0.934
No	14 (28)	10 (20)	22 (44)	8 (16)	36 (36)	18 (18)	15 (15)	0.136
	0.966	0.069	0.806	0.432	0.934	0.136	0.052	3.787
In this process, I started to eat more because I believed that it would increase my body resistance and strengthen my system.								
Yes	6 (12)	0 (0)	12 (24)	1 (2)	18 (18)	1 (1)	0 (0)	0.000
No	18 (36)	16 (32)	15 (30)	10 (20)	33 (33)	26 (26)	22 (22)	18.064
	0.025	7.386	0.005	10.625	0.000	18.064	0.074	3.184
I started to use suggestions shared on personal pages on the internet.								
Yes	6 (12)	2 (4)	3 (6)	2 (4)	9 (9)	4 (4)	3 (3)	0.895
No	18 (36)	14 (28)	24 (48)	9 (18)	42 (42)	23 (23)	19 (19)	0.223
	0.626	0.938	0.752	0.571	0.895	0.223	0.275	1.190
I started using supplements such as vitamins and minerals due to the epidemic.								
Yes	8 (16)	4 (8)	10 (20)	5 (10)	18 (18)	9 (9)	7 (7)	0.956
No	16 (32)	12 (24)	17 (34)	6 (12)	33 (33)	18 (18)	15 (15)	0.090
	0.714	0.674	0.586	1.070	0.956	0.090	0.673	0.178

†n (%); SDND: Students of the department of nutrition and dietetics; SDPR: Students of the department of physiotherapy and rehabilitation; CCCR: Comparison of consumption changes regarding the departments; †: Increasing; ‡: Decreasing; —: Unchanged.

TABLE 5: The effect of nutritional behaviors on body weight change.

Feeding behavior	Status	SDND			SDPR			Total			CCCRD					
		Weight ^{†,↑}	Weight ^{†,-}	Weight ^{†,↓}	Weight ^{†,↑}	Weight ^{†,-}	Weight ^{†,↓}	Weight ^{†,↑}	Weight ^{†,-}	Weight ^{†,↓}	p value	X ²	p value	X ²		
Activity level	↑	1 (2)	2 (4)	3 (6)	0 (0)	3 (6)	0 (0)	4 (8)	4 (8)	5 (5)	2 (2)	6 (6)	0.020	11.694	0.638	0.899
	↓	22 (44)	10 (20)	6 (12)	7 (14)	7 (14)	7 (14)	20 (40)	42 (42)	17 (17)	13 (13)	0.021	11.694	0.638	0.899	
	-	1 (2)	4 (8)	1 (2)	3 (6)	4 (8)	2 (4)	3 (6)	4 (4)	4 (4)	8 (8)	0.000	36.212	0.834	0.362	
Appetite	↑	17 (34)	8 (16)	2 (4)	17 (34)	2 (4)	5 (10)	17 (34)	34 (34)	10 (10)	7 (7)	0.000	36.212	0.834	0.362	
	↓	1 (2)	0 (0)	8 (16)	1 (2)	4 (8)	5 (10)	1 (2)	2 (2)	4 (4)	13 (13)	0.009	13.434	0.970	0.060	
	-	6 (12)	8 (16)	0 (0)	9 (18)	5 (10)	2 (4)	9 (18)	15 (15)	13 (13)	2 (2)	0.039	17.775	0.136	3.987	
Total number of meals per day	↑	9 (18)	3 (6)	2 (4)	11 (22)	3 (6)	1 (2)	11 (22)	18 (18)	20 (20)	6 (6)	0.009	13.434	0.970	0.060	
	↓	8 (16)	3 (6)	5 (10)	5 (10)	3 (6)	8 (16)	5 (10)	13 (13)	13 (13)	6 (6)	0.005	14.743	0.798	0.451	
	-	7 (14)	10 (20)	3 (6)	11 (22)	5 (10)	3 (6)	13 (26)	15 (15)	12 (12)	6 (6)	0.005	14.743	0.798	0.451	
Main meal consumption	↑	6 (12)	1 (2)	0 (0)	12 (24)	1 (2)	1 (2)	12 (24)	18 (18)	2 (2)	1 (1)	0.001	17.775	0.136	3.987	
	↓	7 (14)	2 (4)	5 (10)	2 (4)	2 (4)	4 (8)	2 (4)	9 (9)	4 (4)	9 (9)	0.001	17.775	0.136	3.987	
	-	11 (22)	13 (26)	5 (10)	13 (26)	8 (16)	7 (14)	13 (26)	24 (24)	21 (21)	12 (12)	0.005	14.743	0.798	0.451	
Consumption of snacks	↑	12 (24)	7 (14)	1 (2)	13 (26)	5 (10)	3 (6)	13 (26)	25 (25)	12 (12)	4 (4)	0.005	14.743	0.798	0.451	
	↓	6 (12)	1 (2)	5 (10)	5 (10)	2 (4)	7 (14)	5 (10)	11 (11)	3 (3)	12 (12)	0.005	14.743	0.798	0.451	
	-	6 (12)	8 (16)	4 (8)	9 (18)	4 (8)	2 (4)	9 (18)	15 (15)	12 (12)	6 (6)	0.051	9.427	0.817	0.403	
Tendency to eat at night	↑	13 (26)	9 (18)	1 (2)	18 (36)	4 (8)	4 (8)	18 (36)	31 (31)	13 (13)	5 (5)	0.051	9.427	0.817	0.403	
	↓	3 (6)	2 (4)	0 (0)	1 (2)	0 (0)	4 (8)	1 (2)	4 (4)	2 (2)	4 (4)	0.051	9.427	0.817	0.403	
	-	8 (16)	5 (10)	9 (18)	8 (16)	7 (14)	4 (8)	8 (16)	16 (16)	12 (12)	13 (13)	0.634	2.557	0.867	0.286	
General well-being	↑	4 (8)	2 (4)	4 (8)	5 (10)	2 (4)	1 (2)	5 (10)	9 (9)	4 (4)	5 (5)	0.634	2.557	0.867	0.286	
	↓	16 (32)	9 (18)	5 (10)	18 (36)	7 (14)	6 (12)	18 (36)	34 (34)	16 (16)	11 (11)	0.634	2.557	0.867	0.286	
	-	4 (8)	5 (10)	1 (2)	4 (8)	2 (4)	5 (10)	4 (8)	8 (8)	7 (7)	6 (6)	0.690	2.252	0.398	1.841	
Concern for the future	↑	14 (28)	11 (22)	8 (16)	18 (36)	8 (16)	9 (18)	18 (36)	32 (32)	19 (19)	17 (17)	0.690	2.252	0.398	1.841	
	↓	4 (8)	2 (4)	1 (2)	3 (6)	0 (0)	0 (0)	3 (6)	7 (7)	2 (2)	1 (1)	0.690	2.252	0.398	1.841	
	-	6 (12)	3 (6)	1 (2)	6 (12)	3 (6)	3 (6)	6 (12)	12 (12)	6 (6)	4 (4)	0.176	6.331	0.841	0.345	
Social media usage time	↑	23 (46)	13 (26)	6 (12)	22 (44)	10 (20)	9 (18)	22 (44)	45 (45)	23 (23)	15 (15)	0.176	6.331	0.841	0.345	
	↓	0 (0)	0 (0)	1 (2)	1 (2)	0 (0)	1 (2)	1 (2)	1 (1)	0 (0)	2 (2)	0.176	6.331	0.841	0.345	
	-	1 (2)	3 (6)	3 (6)	4 (8)	1 (2)	2 (4)	4 (8)	5 (5)	4 (4)	5 (5)	0.176	6.331	0.841	0.345	

†:n (%); SDND: Students of the department of nutrition and dietetics; SDPR: Students of the department of physiotherapy and rehabilitation; CCCR: Comparison of consumption changes regarding the departments; †: Increasing; ‡: Decreasing; †: Unchanged.

Nevertheless, in parallel with other studies, in our study it is thought that anxiety for the future, negative thoughts, decreased well-being, increased eating at night and time spent on social media were effective in the inability to establish a complete sleep pattern.^{19,25-27}

It has been found that maintaining a healthy weight and boosting the immune system when under COVID-19 quarantine requires a balanced diet, regular exercise, and sleep.^{24,28} Turkish Cuisine is very effective in the fight against COVID-19.²⁸ In our study, it was found that the majority of students increased their consumption of homemade yeast bread (58%) and yogurt (41%), cheese (40%), which are components of Turkish Cuisine, and continued to consume kefir (74%) and tarhana (68%), which were consumed at a very high rate before the quarantine. It has been reported that these fermented foods containing probiotics may alleviate the effects of COVID-19 by increasing antioxidant activity.^{24,28,29} It was discovered that all of our students consumed these fermented foods more by demonstrating awareness in accordance with the academic curriculum since they are in departments relevant to the field of health.^{10,11} The necessity of protein is emphasized in all dietary recommendations. Especially milk proteins have been reported to provide immune activation by increasing intestinal mucosal antibodies.²⁴ This coincides with our students' increased consumption of milk (47%), eggs (58%), red meat (36%) and unchanged consumption of white meat and fish (57%). In our study, consumption of vegetables (66%), fruits (72%), legumes (52%) and oilseeds (47%) increased ($p > 0.05$). These foods have been recommended to be consumed throughout the pandemic period due to their vitamins and minerals, antioxidants, unsaturated fats, omega 3 fatty acids, and complex carbohydrates.^{24,28} During this period, many people consumed foods they could make at home and moved away from ready-made products. In our study, it was observed that processed meat and packaged ready-to-eat products were consumed less due to the concern that consumption would weaken immune system, and therefore the nutritional behavior model required by COVID-19 period was applied.^{24,28} Our students also increased their consumption of water, which was also strongly recommended.²⁴

It is believed that weight gain during quarantine is not related to the food eaten or the amount of herbal tea, black tea, coffee, or carbonated sugary drinks consumed, but rather to a decline in physical activity and general well-being, an increase in appetite, snack consumption, the tendency to eat at night, worries about the future, and an increase in social media use (Table 3, Table 5). Moreover, it is thought that these behavioral changes would lead to overeating and drinking, and it is also believed that herbal teas were consumed more with the belief that they would provide weight loss and strengthen the immune system. In addition, the consumption of immune-enhancing foods with the thought that they would strengthen the immune system resulted in weight gain.

It was found that the students who participated in our study increased their tendency to unhealthy nutritional behaviors such as night eating due to the increase in their appetite, future concerns, increased time spent on social media and decreased general well-being, and thus they had an increase in their weight (Table 5). In this context, a 39% change in routine eating habits was observed in our study. The body weight of the students who paid attention to their weight gain in order not to increase their body weight remained constant, while the body weight of 36% of the students who did not pay attention ($p < 0.05$) increased. Similarly, it was seen in other studies that 50% of individuals increased their food intake more than normal, resulting in a 30-39% increase in body weight (Table 4).^{30,31} Quarantine reduces the number of contagion but is psychologically challenging for people. Forced separation of people from their families and friends, the uncertainty of the quarantine period and financial burdens cause anxiety and stress.²⁵ In order to cope with these COVID-19-induced stress and negative thoughts, it is known that increase in emotional eating, appetite and consumption of unhealthy snacks in a diet creates a short-term feeling of relief.²⁶ Similar to our study, previous studies have shown that boredom and stress experienced during the quarantine period increased snack consumption, and the food group that increased the most in half of the students were sweet (cakes, pies, pastries, doughnuts, sugar, Turkish delight, milk desserts, honey, molasses, jam, etc.) and salty snacks

(chips, crackers, cakes, cookies), 38% of the students had an increased tendency towards carbohydrate meals and 60% towards carbonated sugary drinks (Table 3).^{27,32} These tendencies may increase cortisol level in the blood and serotonin synthesis in the brain and develop abdominal obesity.^{24,33} Appetite, anxiety and unhealthy eating behaviors are phenomena that feed each other bidirectionally, and as a result of the increase in these phenomena together, weight gain is inevitable in line with the results of our study.

CONCLUSION

In this study, it was determined that students' diet and lifestyle, body weight, sleep patterns, stress and physical activity levels were negatively affected during the COVID-19 quarantine. Since all these factors have an effect on the immune system, the data we obtained strengthened our study. Our study sample consisted only of university students due to their easy accessibility. This constituted the second strength of our study. The weakness of the study is that a different population could not be included and scales with validity and reliability on the subject were not used.

The most effective nutritional model for coping with the negative effects of quarantine on mood is the Mediterranean diet and Turkish Cuisine. Fruits, vegetables and whole grain products are sources of

healthy carbohydrates that are sources of both serotonin and tryptophan. An increase in body weight is inevitable in people who experience emotional hunger and sleep disorders. What is important in this period is to prevent wrong eating habits that may occur due to changing emotional state, to prevent sleep irregularities and to control body weight by increasing physical activity.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

This study is entirely author's own work and no other author contribution.

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