

Depression Levels of University Students and Changes in their Nutritional Status in the COVID-19 Pandemic Quarantine Period: A study in Turkey

Hatice Baygut

Süleyman Demirel University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Isparta, Turkey

Abstract. *Objective:* The objective of this study was to examine the depression levels and nutritional changes of university students during the COVID-19 pandemic quarantine process. *Method:* A cross-sectional study was conducted in 4528 (1726 male and 2802 female) university students, aged between 18–42 years, living in Turkey. A questionnaire form questioning demographic characteristics, anthropometric measurements, dietary changes and BECK Depression Inventory was sent to the university students via the online system (via google form). Analysis results mean \pm s for quantitative data. Categorical data as deviation and median (minimum – maximum) were presented as frequency (percentage). Significance level was taken as $p < 0.050$. *Results:* There was a statistically significant relationship between gender and the BDI score ($p < 0.001$). A statistically significant difference was found between the distributions of general nutritional change in women compared to the BDI groups ($p < 0.001$). Risk factors affecting nutritional changes were analyzed by binary logistic regression analysis as univariate and multivariate models. According to the Univariate model result, the risk of nutritional changes increases 1.042 times when the BDI score increases ($p < 0.001$). The risk of nutritional changes of women is 1.618 times higher than that of men ($p < 0.001$). When the results of the multivariate model are examined, the risk of nutritional changes increases 1.038 times when the BDI score increases ($p < 0.001$). The risk of nutritional changes of women is 1.339 times higher than that of men ($p < 0.001$). *Conclusion:* The quarantine period caused some changes in the nutritional changes and depression levels of university students. As a result, in this study conducted with university students, differences in food preferences and the presence of depressive state were observed during the COVID-19 pandemic quarantine period. It is necessary to be aware of what university students are going through in this period and to take preventive measures to improve their health.

Keywords: COVID-19, university students, nutrition, foods, depression

Introduction

The coronavirus (CoV) infection (2019-nCoV), which emerged in Wuhan, China in late 2019 and spread rapidly to other countries, was named “COVID-19”, an abbreviation of “Coronavirus Disease 2019”, by the World Health Organization (WHO). The COVID-19 agent was named “SARS-CoV-2”

(Severe Acute Respiratory Syndrome Coronavirus 2 virus) due to its close resemblance to SARS CoV (1, 2). COVID-19 disease spread all over the world in a short time and was declared a pandemic on March 11, 2020 (3). The first case in Turkey was detected on the same date (4). This virus, which was found to be transmitted and spread very quickly, has caused governments in all countries to take unique measures,

restrictions, and even ban decisions (4, 5). All of the businesses that have the capacity to serve many people at the same time, such as hotels, hostels, restaurants, bars, cafeterias, were temporarily closed. These changes occurring in social life also manifested itself in the education system (6). Universities were closed in countries where the epidemic was seen. Following the announcement of the first case in Turkey, face-to-face education at universities was suspended as of 14 March 2020. While a closure was announced initially for a few weeks in educational institutions, it was foreseen that universities would not be able to open in the spring term, with the increase in the number of cases and deaths. In order not to interrupt education, distance education initiatives have started in Turkey, as in many countries (7).

Online education has brought with it some difficulties. As societies are heterogeneous socioeconomically and socio-culturally, these difficulties deepen due to the different needs and expectations of individuals from different social groups and different classes. It can sometimes be a problem for students from lower socio-economic status to access online education tools such as the internet and computers. On the other hand, it is known that students with disabilities may also experience problems in accessing online education materials during the pandemic (8).

Along with the developments that cause anxiety in the future careers of university students, COVID-19, which spread in Turkey as well as in the rest of the world and caused a worldwide pandemic, challenges resilience not only physically but also psychologically (9). University students, who had to stay home for a long time during the pandemic quarantine period, felt anxiety, fear, and depression by being exposed to the stress of the uncertainty of the quarantine (10) because intolerance to uncertainty has a core role in the emergence of generalized anxiety (11). The epidemic along with the psychological pressure brought the level of anxiety and worry to the highest levels with sudden, negative, and unexpected changes (9). Furthermore, some preliminary data support the idea that death anxiety may be causing a significant amount of psychological distress during this pandemic (12). In addition, the news that is constantly watched and heard about the pandemic during the quarantine has caused

people to experience increased psychological stress and worry (13).

Health behavior is what individuals do to maintain or enhance their health, to prevent health problems, or to achieve a positive body image (14). While university students are experiencing their emotions intensely, if they have difficulty in determining what their emotions really mean, they try to distract their attention through food, thinking that they cannot cope with this emotional state (15), which turns into a situation where university students get more energy and consume more fat, carbohydrates, and protein (16). The high rate of consumption of diets high in saturated fats, sugars, and refined carbohydrates (collectively called Western diet, WD) worldwide, contributes to the prevalence of obesity and type 2 diabetes, and could place these populations at an increased risk for severe COVID-19 pathology and mortality (17).

The ongoing spread of the pandemic, strict isolation measures, and postponing the opening of universities across the country affect the mental health of university students. For this reason, in the present study it was aimed to examine the depression levels of university students and changes occurring in their dietary intake during the COVID-19 pandemic quarantine process.

Material and Methods

Subjects and survey method

The study was a cross-sectional type and was conducted with adult university students aged ≥ 18 . This study was conducted between 01.09.2020 and 01.06.2021 at Ondokuz Mayıs University in Turkey. In the study, it was aimed to reach 884 people with 0.05 sampling error and 95% reliability. In total, 4528 voluntary students, between the ages of 18 and 42 years, were recruited in this study. They were informed about the study, and signed a participation consent form. The study adhered to the Declaration of Helsinki Protocols (World Medical Association). The study was approved by the Ethics Committee of Ondokuz Mayıs University with the number of 2020-534. The study did not include individuals who were not university students.

Subjects were excluded from the study if they were unwilling to participate.

Questionnaires

A questionnaire form questioning demographic characteristics, anthropometric measurements, and dietary changes, and the BECK Depression Inventory (BDI) were sent to the university students via a Google Form, and university students were included in the study on a voluntary basis. Anthropometric measurements were determined based on self-report. The World Health Organization classification was used to evaluate BMI. Individuals with a BMI of $<18.5 \text{ kg/m}^2$ are underweight, $18.5\text{--}24.9 \text{ kg/m}^2$ are normal weight, $25.0\text{--}29.9 \text{ kg/m}^2$ are overweight, and $>30.0 \text{ kg/m}^2$ are obese (18). The BDI was used to determine the presence of depression. It was developed by Beck et al. in 1961 to measure the behavioral findings of depression in adolescents and adults (19). It was translated into Turkish and its validity and reliability study was carried out by Hisli (20). In the scale, depression-specific behaviors and symptoms are defined by a series of statements, and each statement is numbered from 0 to 3. The scale consists of 21 items, which are sorted from light form to severe form. The score that can be obtained varies between 0 and 63 (0=Positive statements about depression, 3=Shows negative statements about depression). As violence, it is interpreted as “0-9=minimal”, “10-16=mild”, “17-29=medium”, and “30-63=severe” (21). Nutritional changes were evaluated with the answers of ‘I eat less than usual’, ‘I eat more than usual’, and ‘Not changed’ in the chart containing 29 foods.

Statistical analysis

Data were analyzed with IBM SPSS V23. Conformity to normal distribution was evaluated with the Kolmogorov-Smirnov test. The Chi-square test was used to compare categorical variables according to groups. The Kruskal-Wallis test was used to compare data that were not normally distributed according to the BDI groups, and multiple comparisons were analyzed with Dunn’s test. Binary logistic regression analysis was used to examine the effect of the BDI score on the change in your eating habits after the pandemic

process started. Analysis results mean \pm s for quantitative data. Analysis results are presented as mean \pm standard deviation and median (minimum – maximum) for quantitative data, and categorical data are presented as frequency (percentage).

Results

Table 1 shows that there was a statistically significant relationship between gender and the BDI score ($p<0.001$). While the rate of men (53.3%) with a low BDI score was significantly higher than the rate of women (32.1%), the rate of women with medium and high BDI scores (33.3%, 12.8%) was significantly higher than that of men (18.3%, 5.6%). Accordingly, we can say that the level of depression was higher in women.

Table 2 shows that there was a statistically significant difference between BDI levels in terms of age, height, weight, and BMI values ($p<0.001$). Accordingly, the increase in age in men increased the level of depression; and in women, this situation remained more proportional. There was no difference in gender according to height and weight. However, when examined in total, we can say that the level of depression increases as the height decreases, and on the contrary, the level of depression increases as the weight decreases. When the depression levels were examined according to the BMI measurement, with an increase in the BMI measurement in women, the level of depression increased, while this situation remained more proportional in the men.

Table 3 shows that there was a statistically significant relationship between BMI and BDI scores in terms of gender ($p<0.001$). Accordingly, mild depression (21.5%) was seen significantly higher in underweight women, minimal and severe depression were observed significantly higher in normal weight women (82.6%, 85.0%), moderate and severe depression were seen significantly higher in overweight women (19.0%, 12.0%), and mild depression (5.9%) was seen significantly higher in obese women. Mild depression (21.6%) was seen significantly higher in underweight men, moderate and severe depression rates were seen significantly higher in normal weight men (75.2%,

79.4%), minimal depression was seen significantly higher in overweight men (37.4%), and minimal depression (2.9%) was seen significantly higher in obese men. Considering these rates, the depression rate of underweight women was low, while this situation differs slightly in normal weight women, and depression rates were both minimal and severe at extreme points. While the rate of depression was high in overweight women, the rate of depression was low in obese women. While the depression rate of underweight men was low, the depression rate of normal weight men was high, and the depression rate of overweight and obese men was minimal. In terms of total values, mild depression rate (21.5%) was significantly higher in underweight participants, severe depression (83.8%) in normal weight individuals, minimal depression (21.2%) in overweight participants, and mild depression in obese participants (4.5%).

Table 4 presents that there was a statistically significant relationship between gender and nutrition types (except for offal and bread) ($p < 0.05$). Accordingly, women's normal consumption rates of milk (18.9%), meat products (42.9%), cereals (46%), pastries (25.5%), fresh fruits (47.7%), oilseeds (53.1%), sugary foods (37.8%), fast food (30.0%), and carbonated drinks (52.6%) groups were significantly higher than the normal consumption rate of men. Males' normal consumption rates of yoghurt (43.4%), cheese (51.1%), egg (42%), red meat (54.3%), chicken meat (14.8%), dried fruits (37.4%), green leafy vegetables (26.2%), other vegetables (25.1%), liquid (40.3%), desserts (22.6%), energy drinks (29.5%) and alcoholic beverages (20.6%) groups were significantly higher than normal consumption rates of women. The rates of no change in the consumption of ayran-kefir (56.1%), Turkey meat (64.8%), fish (45.8%), legumes (40.6%), and solid fats (51.7%) of women were significantly

higher than the rates of men. The rate of no change in the consumption of the packed foods (46%) group of men was higher than the rate of women.

In Table 5, a statistically significant difference was found between the distributions of general nutritional change in women compared to the BDI groups ($p < 0.001$). There was no nutritional change in 96.2% in female participants with minimal depression, 92.1% in female participants with mild depression, 90.6% in female participants with medium depression, and 97.8% in female participants with severe depression. A statistically significant difference was found between the distributions of general nutritional change in men compared to the BDI groups ($p < 0.001$). There was no nutritional change in 86.1% in male participants with minimal depression, 80.2% in male participants with mild depression, 89.2% in male participants with medium depression, and 69.1% in male participants with severe depression. A statistically significant difference was found between the distributions of general nutritional change according to the BDI groups, regardless of gender ($p < 0.001$). There was no nutritional change in 91.1% in participants with minimal depression, 87.5% in participants with mild depression, 90.2% in participants with medium depression, and 91.7% in participants with severe depression.

In Table 6, risk factors affecting nutritional changes were analyzed by binary logistic regression analysis as univariate and multivariate models. According to the Univariate model result, the risk of nutritional changes increases 1.042 times when the BDI score increases ($p < 0.001$). The risk of nutritional changes of women is 1.618 times higher than that of men ($p < 0.001$). BMI was not statistically significant ($p > 0.050$). When the results of the multivariate model are examined, the risk of nutritional changes increases 1.038 times when the BDI score increases ($p < 0.001$). The risk of nutritional

Table 1: Beck depression classification according to gender

Beck Depression Scale	Female (n=2802) n(%)	Male (n=1726) n(%)	Total (n=4528) n(%)	Test statistic	p
Minimal	899(32.1)a	920(53.3)b	1819(40.2)	=262.809	<0.001
Mild	611(21.8)a	394(22.8)a	1005(22.2)		
Medium	933(33.3)a	315(18.3)b	1248(27.6)		
Severe	359(12.8)a	97(5.6)b	456(10.1)		

: Chi-square test statistic, a-b: no difference between genders with the same letter

Table 2: The relationship of age, height, weight and BMI with the Beck Depression Inventory

Beck Depression Inventory	Minimal Mean±SD	Mild Mean±SD	Medium Mean±SD	Severe Mean±SD	Test statistic	p	
Gender	Median(Min-Max)	Median(Min-Max)	Median(Min-Max)	Median(Min-Max)			
Age	Female	21.16 ± 1.85 21.00(19.00-42.00)b	21.26 ± 1.42 21.00(19.00-30.00)ab	21.39 ± 1.60 21.00(19.00-30.00)a	21.35 ± 2.16 21.00(18.00-26.00)b	=26.960	<0.001
	Male	21.75 ± 1.75 22.00(20.00-41.00)b	21.41 ± 1.95 21.00(19.00-29.00)c	22.17 ± 1.83 23.00(20.00-29.00)a	22.82 ± 2.46 23.00(19.00-27.00)a	=67.424	<0.001
	Total	21.46 ± 1.82 21.00(19.00-42.00)b	21.32 ± 1.65 21.00(19.00-30.00)b	21.58 ± 1.69 21.00(19.00-30.00)a	21.66 ± 2.31 21.00(18.00-27.00)ab	=25.564	<0.001
Height (cm)	Female	164.29 ± 5.51 165.00(150.00-180.00)b	164.37 ± 5.33 165.00(150.00-177.00)b	163.62 ± 5.43 164.00(150.00-178.00)a	164.37 ± 5.85 165.00(150.00-175.00)b	=18.513	<0.001
	Male	176.54 ± 6.67 175.00(163.00-193.00)b	178.14 ± 7.33 177.00(155.00-190.00)a	177.54 ± 7.77 175.00(160.00-196.00)b	177.35 ± 5.57 178.00(167.00-195.00)ab	=23.376	<0.001
	Total	170.48 ± 8.66 170.00(150.00-193.00)c	169.77 ± 9.14 169.00(150.00-190.00)b	167.13 ± 8.59 166.00(150.00-196.00)a	167.13 ± 7.86 165.00(150.00-195.00)a	=157.366	<0.001
Weight (kg)	Female	56.82 ± 7.43 57.00(42.00-96.00)b	57.73 ± 10.97 56.00(44.00-90.00)b	58.90 ± 8.78 58.00(42.00-100.00)a	60.13 ± 9.13 55.00(48.00-92.00)a	=50.014	<0.001
	Male	75.12 ± 10.88 75.00(55.00-107.00)b	69.60 ± 11.65 70.00(50.00-103.00)a	74.27 ± 11.79 74.00(46.00-96.00)b	73.89 ± 9.59 74.00(58.00-110.00)b	=67.774	<0.001
	Total	66.07 ± 13.07 64.00(42.00-107.00)a	62.39 ± 12.64 60.00(44.00-103.00)b	62.78 ± 11.72 59.00(42.00-100.00)b	63.06 ± 10.80 62.00(48.00-110.00)b	=79.587	<0.001
BMI	Female	21.04 ± 2.42 20.70(14.88-32.08)b	21.37 ± 3.96 20.80(15.92-36.05)b	22.03 ± 3.28 21.23(16.79-37.18)a	22.22 ± 2.78 21.91(17.01-30.04)a	=68.439	<0.001
	Male	24.15 ± 3.58 23.88(17.79-34.29)b	21.90 ± 3.19 22.04(17.11-31.79)a	23.48 ± 2.89 23.94(16.30-37.50)b	23.43 ± 2.19 23.26(19.38-28.93)b	=100.709	<0.001
	Total	22.61 ± 3.44 21.61(14.88-34.29)b	21.58 ± 3.68 21.45(15.92-36.05)a	22.40 ± 3.25 22.05(16.30-37.50)b	22.47 ± 2.71 22.64(17.01-30.04)b	=88.749	<0.001

: Kruskal Wallis test statistic, a-c: No difference between Beck Depression Inventory groups with the same letter, mean ± standard deviation, median (minimum – maximum)

Table 3: The relationship of BMI classifications with the Beck Depression Inventory

Beck Depression Inventory	Minimal n(%)	Mild n(%)	Medium n(%)	Severe n(%)	Test statistic	p	
Gender	BMI classifications						
Female	Underweight	111(12.3)a	130(21.5)b	81(8.7)a	6(1.7)c	=277.771	<0.001
	Normal	743(82.6)a	408(67.3)b	664(71.2)b	305(85)a		
	Overweight	41(4.6)a	32(5.3)a	177(19)b	43(12)c		
	Obese	4(0.4)a	36(5.9)b	11(1.2)a	5(1.4)a		
Male	Underweight	38(4.1)a	85(21.6)b	5(1.6)a	0(0)a	=232.208	<0.001
	Normal	511(55.5)a	248(62.9)a	237(75.2)b	77(79.4)b		
	Overweight	344(37.4)a	52(13.2)b	69(21.9)c	20(20.6)bc		
	Obese	27(2.9)	9(2.3)	4(1.3)	0(0)		
Total	Underweight	149(8.2)a	215(21.5)b	86(6.9)a	6(1.3)c	=303.672	<0.001
	Normal	1254(68.9)ab	656(65.6)b	901(72.2)a	382(83.8)c		
	Overweight	385(21.2)a	84(8.4)b	246(19.7)a	63(13.8)c		
	Obese	31(1.7)a	45(4.5)b	15(1.2)a	5(1.1)a		

: Chi-square test statistic, a-c: No difference between beck depression groups with the same letter in each condition, frequency (percent)

Table 4: Comparison of nutritional changes according to gender

	Female				Male				Total				Test statistic	P
	I eat less than usual n(%)	I eat more than usual n(%)	Not changed n(%)	I eat less than usual n(%)	I eat more than usual n(%)	Not changed n(%)	I eat less than usual n(%)	I eat more than usual n(%)	Not changed n(%)	I eat less than usual n(%)	I eat more than usual n(%)	Not changed n(%)		
Milk	523(18.7)a	530(18.9)a	1749(62.4)	365(21.1)b	273(15.8)b	1088(63)	888(19.6)	803(17.7)	2837(62.7)	-9.200	0.010			
Yoghurt	245(8.7)	1062(37.9)a	1495(53.4)a	161(9.3)	749(43.4)b	816(47.3)b	406(9.0)	1811(40.0)	2311(51.0)	=16.196	<0.001			
Ayran/Kefir	308(11)a	921(32.9)	1573(56.1)a	325(18.8)b	593(34.4)	808(46.8)b	633(14)	1514(33.4)	2381(52.6)	=65.300	<0.001			
Cheese	340(12.1)a	1182(42.2)a	1280(45.7)a	152(8.8)b	882(51.1)b	692(40.1)b	492(10.9)	2064(45.6)	1972(43.6)	=37.175	<0.001			
Egg	446(15.9)	912(32.5)a	1444(51.5)a	263(15.2)	725(42)b	738(42.8)b	709(15.7)	1637(36.2)	2182(48.2)	=43.808	<0.001			
Red meat	412(14.7)a	1115(39.8)a	1275(45.5)a	124(7.2)b	937(54.3)b	665(38.5)b	536(11.8)	2052(45.3)	1940(42.8)	=112.660	<0.001			
Chicken meat	786(28.1)a	37(1.3)a	1979(70.6)a	561(32.5)b	255(14.8)b	910(52.7)b	1347(29.7)	292(6.4)	2889(63.8)	=360.561	<0.001			
Turkey meat	429(15.3)a	557(19.9)	1816(64.8)a	462(26.8)b	350(20.3)	914(53.0)b	891(19.7)	907(20.0)	2730(60.3)	=96.230	<0.001			
Fish	777(27.7)	743(26.5)	1282(45.8)a	519(30.1)	491(28.4)	716(41.5)b	1296(28.6)	1234(27.3)	1998(44.1)	=7.916	0.019			
Offal	287(10.2)	1165(41.6)	1350(48.2)	161(9.3)	704(40.8)	861(49.9)	448(9.9)	1869(41.3)	2211(48.8)	=1.700	0.427			
Meat products (salami, sausage, etc.)	308(11.0)a	1201(42.9)a	1293(46.1)	228(13.2)b	671(38.9)b	827(47.9)	536(11.8)	1872(41.3)	2120(46.8)	=9.256	0.010			
Legumes (chickpeas, beans, etc.)	609(21.7)a	1055(37.7)	1138(40.6)a	450(26.1)b	662(38.4)	614(35.6)b	1059(23.4)	1717(37.9)	1752(38.7)	=15.743	<0.001			
Cereals (rice, pasta, etc.)	674(24.1)a	1289(46)a	839(29.9)a	469(27.2)b	595(34.5)b	662(38.4)b	1143(25.2)	1884(41.6)	1501(33.1)	=61.039	<0.001			
Bread	264(9.4)	1571(56.1)	967(34.5)	137(7.9)	972(56.3)	617(35.7)	401(8.9)	2543(56.2)	1584(35)	=3.136	0.208			
Pastries (bread, bagel, etc.)	432(15.4)a	715(25.5)a	1655(59.1)	317(18.4)b	370(21.4)b	1039(60.2)	749(16.5)	1085(24.0)	2694(59.5)	=13.266	0.001			
Fresh Fruits	274(9.8)a	1337(47.7)a	1191(42.5)	242(14)b	714(41.4)b	770(44.6)	516(11.4)	2051(45.3)	1961(43.3)	=27.465	<0.001			
Dried Fruits	357(12.7)	886(31.6)a	1559(55.6)a	224(13)	645(37.4)b	857(49.7)b	581(12.8)	1531(33.8)	2416(53.4)	=17.662	<0.001			
Green Leafy Vegetables	468(16.7)a	648(23.1)a	1686(60.2)a	401(23.2)b	453(26.2)b	872(50.5)b	869(19.2)	1101(24.3)	2558(56.5)	=45.615	<0.001			
Other Vegetables	626(22.3)a	497(17.7)a	1679(59.9)a	472(27.3)b	433(25.1)b	821(47.6)b	1098(24.2)	930(20.5)	2500(55.2)	=68.653	<0.001			
Liquid Oils (sunflower oil, olive oil, etc.)	385(13.7)a	948(33.8)a	1469(52.4)a	198(11.5)b	696(40.3)b	832(48.2)b	583(12.9)	1644(36.3)	2301(50.8)	=20.414	<0.001			
Solid Fats (butter, margarine, etc.)	596(21.3)a	757(27.0)	1449(51.7)a	413(23.9)b	483(28)	830(48.1)b	1009(22.3)	1240(27.4)	2279(50.3)	=6.539	0.038			
Oilseeds (walnuts, hazelnuts, etc.)	521(18.6)	1488(53.1)a	793(28.3)a	292(16.9)	666(38.6)b	768(44.5)b	813(18)	2154(47.6)	1561(34.5)	=130.254	<0.001			
Sugary Foods (honey, jam, etc.)	818(29.2)a	1058(37.8)a	926(33)a	433(25.1)b	586(34)b	707(41)b	1251(27.6)	1644(36.3)	1633(36.1)	=29.332	<0.001			
Desserts (milk desserts, dumplings, etc.)	1312(46.8)a	511(18.2)a	979(34.9)a	656(38)b	390(22.6)b	680(39.4)b	1968(43.5)	901(19.9)	1659(36.6)	=35.094	<0.001			

Table 4: Comparison of nutritional changes according to gender

	Female				Male				Total				Test statistic	p
	I eat less than usual n(%)	I eat more than usual n(%)	Not changed n(%)	I eat less than usual n(%)	I eat more than usual n(%)	Not changed n(%)	I eat less than usual n(%)	I eat more than usual n(%)	Not changed n(%)	I eat less than usual n(%)	I eat more than usual n(%)	Not changed n(%)		
Packaged Foods (chocolate, chips, etc.)	414(14.8)a	1341(47.9)	1047(37.4)a	117(6.8)b	815(47.2)	794(46)b	531(11.7)	2156(47.6)	1841(40.7)	=77.923	<0.001			
Fast food (hamburger, lahmacun, etc.)	596(21.3)a	840(30.0)a	1366(48.8)a	459(26.6)b	277(16)b	990(57.4)b	1055(23.3)	1117(24.7)	2356(52.0)	=112.209	<0.001			
Carbonated drinks (cola, soda, etc.)	369(13.2)	1474(52.6)a	959(34.2)a	227(13.2)	721(41.8)b	778(45.1)b	596(13.2)	2195(48.5)	1737(38.4)	=58.630	<0.001			
Energy drinks	921(32.9)a	735(26.2)a	1146(40.9)	499(28.9)b	510(29.5)b	717(41.5)	1420(31.4)	1245(27.5)	1863(41.1)	=9.718	0.008			
Alcoholic beverages	751(26.8)a	443(15.8)a	1608(57.4)a	301(17.4)b	355(20.6)b	1070(62.0)b	1052(23.2)	798(17.6)	2678(59.1)	=57.851	<0.001			

: Chi-square test statistic, a-b: No difference between genders with the same letter in each case, frequency (percent)

changes of women is 1.339 times higher than that of men ($p < 0.001$). BMI was not statistically significant ($p > 0.050$).

Discussion

This study examined the university students' depression levels and nutritional intake status during the COVID-19 pandemic quarantine period. The findings provided evidence to support our hypotheses: during the COVID-19 pandemic quarantine period, students' depression levels would significantly increase and negatively affect their nutritional status.

COVID 19 caused psychological reactions in university students (22). In our study, 40.2% of the students had minimal depression, 22.2% mild depression, 27.6% medium depression, and 10.1% severe depression, and females were found to be more severely depressed than males (Table 1). Furthermore, the median age of those with minimal, mild, medium, and severe depression was 21.0 years (Table 2). It is stated that the most common psychiatric disease in the world and Turkey is depression and the lifetime risk for major depressive disorder is 5-12% in men and 10-25% in women. In a study conducted in Turkey, although university students were found to have a medium level depression, some students were found to have severe depression symptoms (23). In one study, students were reported to experience heightened depression and around 15% of the students reportedly had medium depression, whereas 18.1% were severely suffering from anxiety (24). In another study, they found that female students significantly higher depression, anxiety, and stress than male students; and, young adult students (aged 18-24 years) had more symptoms of depression, anxiety, and suicidality than adult students (25 years) (25). In a study conducted in the USA, using multi-variable logistical regression to assess the association between COVID-19-related stressors and depression and anxiety symptoms, they found a high prevalence and severity of depression and anxiety symptoms (17). In another study, they also found among 2031 participants that 48.14% showed a moderate-to-severe level of depression, 38.48% showed a moderate-to-severe level of anxiety, and 18.04% had suicidal thoughts. A

Table 5: The relationship of nutritional changes with beck depression scale

Beck Depression Scale		Minimal n(%)	Mild n(%)	Medium n(%)	Severe n(%)	Test statistic	p
Gender	Nutritional Changes						
Female	I eat less than usual	629(70.0)a	514(84.1)b	774(83)b	282(78.6)b	=146.524	<0.001
	I eat more than usual	760(84.5)a	551(90.2)b	879(94.2)c	311(86.6)ab		
	Not changed	865(96.2)a	563(92.1)b	845(90.6)b	351(97.8)a		
Male	I eat less than usual	658(71.5)a	327(83)b	273(86.7)b	84(86.6)b	=232.158	<0.001
	I eat more than usual	650(70.7)a	353(89.6)b	314(99.7)c	83(85.6)b		
	Not changed	792(86.1)a	316(80.2)b	281(89.2)a	67(69.1)b		
Total	I eat less than usual	1287(70.8)a	841(83.7)b	1047(83.9)b	366(80.3)b	=332.064	<0.001
	I eat more than usual	1410(77.5)a	904(90)b	1193(95.6)c	394(86.4)b		
	Not changed	1657(91.1)a	879(87.5)b	1126(90.2)ab	418(91.7)ab		

: Chi-square test statistic, a-c: No difference between beck depression groups with the same letter in each condition, frequency (percent)

majority of participants (71.26%) indicated that their stress/anxiety levels increased during the pandemic. Less than half of the participants (43.25%) indicated that they were able to cope adequately with the stress related to the current situation (26). Depression rates among university students in different countries can be affected by social, cultural, and socio-economic characteristics, as well as by the length of the pandemic quarantine period. In this study, we determined that the prevalence of depression in university students was similar to the prevalence of depression in the world.

Little is known about the effects of quarantine on obesity, although everyone agrees that this corresponds to a period of severe stress and stress can be linked to an increased risk of obesity (27). In our study, BMI values of minimally, mildly, moderately, and severely depressed individuals were found to be 21.61, 21.45, 22.05, 22.64, respectively (Table 2). Moreover, a statistically significant difference was found between the distribution of the BMI classes according to the BDI groups, regardless of gender ($p < 0.001$) (Table 3). In a study, adverse mental burden linked to the COVID-19 pandemic

was greatly associated with increased weight gain and individuals with obesity significantly gained weight 1 month after the beginning of the quarantine (28). During the quarantine period of the Covid-19 epidemic period, body weight of 44.6% of the students changed, 31.2% of them did not change, and 24.2% of them did not know if there was any change in their body weight. It was determined that 85 students experienced an average body weight gain of 2.0 ± 1.26 kg and 31 students reported an average of 2.5 ± 1.03 kg body weight loss (29). It was found in a study that there was a statistically significant difference between the BMI of the students and the DASS 42 depression scale mean scores ($p < 0.05$) (30). One of the consequences of quarantine obesity is a change in lifestyle and eating habits. In this study, we determined that severely depressed university students had the highest BMI value.

Although university students are still a developing group, they generally tend to intake inadequate and unbalanced nutrition. The fact that food choices are mostly high-carbohydrate foods affects the academic success and general health of this group (31, 32).

Table 6. The binary logistic regression analysis of the factors associated with nutritional changes

	Univariate		Multivariate	
	OR (%95 CI)	p	OR (%95 CI)	p
BECK Depression Inventory	1.042(1.036-1.048)	<0.001	1.038(1.032-1.045)	<0.001
Gender (Reference: Male)	1.618(1.434-1.826)	<0.001	1.339(1.174-1.527)	<0.001
BMI	0.99(0.973-1.007)	0.250	1.001(0.982-1.019)	0.950

OR: Odds ratio, CI: Confidence interval

In our study, they consumed cheese, red meat, cereals, bread, pastries, fresh fruits, oilseeds, sugary foods, prepared foods, carbonated drinks more than usual and desserts less than usual. It was determined that the consumption of milk, yoghurt, ayran-kefir, egg, chicken meat, Turkey meat, fish, offal, meat products, legumes, pastries, dried fruits, green leafy vegetables, other vegetables, liquid oils, solid fats, fast food, energy drinks, alcoholic beverages did not change (Table 3). In a study, university students experienced significant, and often negative, changes in food choices during the COVID-19 pandemic due to changes in food availability and food-related roles (33). In a study in Poland, eggs, potatoes, sweets, canned meat and alcohol were consumed considerably more commonly during lockdown, while fast-food products, instant soups, and energy drinks were consumed significantly less frequently. A marked decrease in the number of daily servings of the following products was observed: bakery products, red meat, fast food, instant soups, sweet beverages, and energy drinks. Conversely, the number of daily servings of sweets and canned meat significantly increased (34). In a study conducted during the pandemic period, the eating behaviors and depression situations of university students were examined, and a positive and significant correlation was found between the mean scores of depression and restrictive eating behaviors of students (35). In this specific period, self-isolation may have been associated with a change in selected eating habits, including snacking or over-eating caused by staying at home that changed energy requirements. Emotional eating and external eating behaviors increased as students' depression increased and restrictive eating, emotional eating, and external eating behaviors increased as students' anxiety and stress increased. In this study, we determined that the consumption of unhealthy snacks increased in university students.

Modifiable lifestyle factors, such as appropriate nutritional status, are particularly helpful for preventing mental illnesses (36). In our study, it was observed that minimally, mildly, moderately, and severely depressed individuals stated that they would eat more or less than usual (Table 5). According to the univariate model result, the risk of nutritional changes increases 1.042 times when the Beck depression score increases

($p < 0.001$). The risk of nutritional changes of women is 1.618 times higher than that of men ($p < 0.001$). When the results of the multivariate model are examined, the risk of nutritional changes increases 1.038 times when the BDI score increases ($p < 0.001$). The risk of nutritional changes of women is 1.339 times higher than that of men ($p < 0.001$) (Table 6). In a study, it was found that there was no statistically significant relationship between the students' depression level and restrictive eating behavior (13). In another study conducted during the pandemic process, where the eating behaviors and depression situations of university students were examined, a positive and significant correlation was found between the mean scores of depression and restrictive eating behaviors of students (37). During the COVID pandemic quarantine period, nutritional habits changed dramatically in parallel with the increase in anxiety and stress values among the university students. According to our study results, nutritional changes were recognized as the essential factors of mental health status.

Conclusion

The quarantine period caused some changes in the nutritional intake and depression levels of university students. As a result, in this study, which was conducted with university students, differences in food preferences and the presence of depressive state were observed during the COVID-19 pandemic quarantine period. Many factors such as compulsory quarantine and fear of COVID-19 disease, stress, sleep/wake cycle changes, eating disorders, and income anxiety negatively affected university students' nutrition behaviors and mental health. It may be imperative to be aware of what university students are going through in this period and to take preventive measures to improve their health. Health promotion approaches and interventions geared towards university students should be developed by health organizations and researchers as an effective way to better manage mental health, stress, and nutrition during health emergencies. In addition, the nutrition intake status and mental health of university students who have COVID-19 disease should be monitored and evaluated with further studies.

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References

- Rismanbaf A. Potential treatments for COVID-19; a narrative literature review. *Archives of academic emergency medicine*, 2020; 8(1): e29.
- Muscogiuri G, Barrea L, Savastano S, Colao A. Nutritional recommendations for CoVID-19 quarantine. *European Journal of Clinical Nutrition*, 2020; 74(6): 850-851. doi: 10.1038/s41430-020-0635-2
- WHO. (2020). Coronavirus Disease (COVID-2019). [cited 2021 Oct 21]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- T.C. Sağlık Bakanlığı. (2020). Genel Koronavirüs Tablosu. [cited 2021 June 20]. Available from: <https://covid19.saglik.gov.tr/TR66935/genel-koronavirus-tablosu.html#>.
- Yüksel A. COVID-19 Pandemi Döneminde Elit Sporcuların Uyku Kalitesi ile Beslenme Durumunun Değerlendirilmesi. *OPUS Uluslararası Toplum Araştırmaları Dergisi*, 2021; 17(11): 3919-3942. doi: 10.26466/opus.909434
- Uluöz E. Opinions of the Faculty of Sport Sciences Students on the Changes in Education System during COVID-19 Pandemic: A Qualitative Research. *African Educational Research Journal*, 2020; 8(3): 481-490. doi: 10.30918/AERJ.83.20.114
- Özcan E, Tosun N, Eken DT. Covid-19 Salgını ile Acil ve Zorunlu Uzaktan Eğitim Geçi : Genel Bir Değerlendirme. *Milli Eğitim Dergisi*, 2020; 49(1): 113-128. doi: 10.37669/milliegitim.780722
- Vanlı B. Pandemi Sürecinde Eğitim Dönümü: Çevrimiçi Eğitimin Sosyolojik Yansımaları. *Avrasya Uluslararası Araştırmalar Dergisi*, 2021; 9(26): 237-249.
- Ceviz N, Tekta N, Basmacı G, Tekta M. Covid 19 pandemi sürecinde üniversite öğrencilerinin kaygı düzeylerini etkileyen değişkenlerin analizi. *International Journal of Scholars in Education*, 2020; 3(2): 312-329.
- Altena E, Baglioni C, Espie CA, et al. Dealing with sleep problems during home confinement due to the COVID 19 outbreak: Practical recommendations from a task force of the European CBT I Academy. *Journal of sleep research*, 2020; 29(4): e13052. doi: 10.1111/jsr.13052
- Duman N. Üniversite öğrencilerinde COVID-19 korkusu ve belirsizlik tahammülsüzlük. *The Journal of Social Science*, 2020; 4(8): 426-437. doi: 10.30520/tjsosci.748404
- Menzies RE, Menzies RG. Death anxiety in the time of COVID-19: Theoretical explanations and clinical implications. *The Cognitive Behaviour Therapist*, 2020; 13(19):1-11. doi: 10.1017/S1754470X20000215
- Evers C, Adriaanse M, de Ridder DT, de Witt Huberts JC. Good mood food. Positive emotion as a neglected trigger for food intake. *Appetite*, 2013; 68: 1-7. doi: 10.1016/j.appet.2013.04.007
- Zandian H, Sarailoo M, Dargahi S, Gholizadeh H, Dargahi A, Vosoughi M. Evaluation of knowledge and health behavior of university of medical sciences students about the prevention of COVID-19. *Work*, 2021; 68(3): 543-549. doi: 10.3233/WOR-203395
- Serin Y, Anlıer N. Duygusal yeme, besin alımını etkileyen faktörler ve temel hemirelik yaklaşımları. *Psikiyatri Hemireli i Dergisi*, 2018; 9(2): 135-146. doi: 10.14744/phd.2018.23600
- Moynihan AB, Van Tilburg WA, Igou ER, Wisman A, Donnelly AE, Mulcaire JB. Eaten up by boredom: consuming food to escape awareness of the bored self. *Frontiers in psychology*, 2015; 6: 369. doi: 10.3389/fpsyg.2015.00369
- Butler MJ, Barrientos RM. The impact of nutrition on COVID-19 susceptibility and long-term consequences. *Brain, behavior, and immunity*, 2020; 87: 53-54. doi: 10.1016/j.bbi.2020.04.040
- World Health Organization. (2000). Obesity: preventing and managing the global epidemic (No. 894). [cited 2020 Dec 28]. Available from: https://www.who.int/nutrition/publications/obesity/WHO_TRS_894/en/.
- Beck AT, Ward C, Mendelson M, Mock J, Erbaugh JJAGP. Beck depression inventory (BDI). *Arch Gen Psychiatry*, 1961; 4(6): 561-571.
- Hisli N. Beck depresyon envanterinin üniversite öğrencileri için geçerliliği, güvenilirliği. (A reliability and validity study of Beck Depression Inventory in a university student sample). *J. Psychol.*, 1989; 7: 3-13.
- Kılınç S, Torun F. Türkiye’de klinikte kullanılan depresyon değerlendirme ölçekleri. *Dirim Tıp Gazetesi*, 2011; 86(1): 39-47.
- Rudensine S, McNeal K, Schulder T, Ettman CK, Hernandez M, Gvozdieva K, Galea S. Depression and anxiety during the covid 19 pandemic in an urban, low income public university sample. *Journal of traumatic stress*, 2021; 34(1): 12-22. doi: 10.1002/jts.22600
- Dikmen M. COVID-19 Pandemisinde Üniversite Öğrencilerinin Depresyon Düzeylerinin Sosyal Medya Başlılı Üzerindeki Rolünün İncelenmesi: Bir Yapısal Etkilik Modeli. *Başlılık Dergisi*, 2021; 22(1): 20-30. doi: 10.51982/bagimli.790750
- Islam MA, Barna SD, Raihan H, Khan MNA, Hossain MT. Depression and anxiety among university students during the COVID-19 pandemic in Bangladesh: A web-based cross-sectional survey. *PloS one*, 2020; 15(8): e0238162. doi: 10.1371/journal.pone.0238162
- Debowska A, Horeczy B, Boduszek D, Dolinski D. A repeated cross-sectional survey assessing university students’ stress, depression, anxiety, and suicidality in the early stages of the COVID-19 pandemic in Poland. *Psychological Medicine*, 2020; 1-4. doi: 10.1017/S003329172000392X
- Wang X, Hegde S, Son C, Keller B, Smith A, Sasangohar F. Investigating mental health of US college students during the COVID-19 pandemic: Cross-sectional survey study. *Journal of medical Internet research*, 2020; 22(9): e22817.

- doi: 10.2196/22817
27. Mattioli AV, Pinti M, Farinetti A, Nasi M. Obesity risk during collective quarantine for the COVID-19 epidemic. *Obesity medicine*, 2020; 20: 100263. doi: 10.1016/j.obmed.2020.100263
 28. Pellegrini M, Ponzio V, Rosato R, Scumaci E, Goitre I, Benso A, Bo S. Changes in weight and nutritional habits in adults with obesity during the “lockdown” period caused by the COVID-19 virus emergency. *Nutrients*, 2020; 12(7): 2016. doi: 10.3390/nu12072016
 29. Gürel S, Ok MA. Covid-19 Salgın Sürecinin, Sağlık Eitimi Alan Ö rencilerin Beslenme Alı kanlıkları, Fiziksel Aktivite ve Vücut A ırlıkları Üzerine Etkisinin Saptanması. *Ba kent Üniversitesi Sağlık Bilimleri Fakültesi Dergisi-BÜSB D*, 2021; 6: 1-15.
 30. Kalkan U urlu Y, Mataracı De irmenci D, Durgun H, Gök U ur H. The examination of the relationship between nursing students’ depression, anxiety and stress levels and restrictive, emotional, and external eating behaviors in COVID 19 social isolation process. *Perspectives in Psychiatric Care*, 2021; 57(2): 507-516. doi: 10.1111/ppc.12703
 31. Açıkgöz S. (2006). Üniversite ö rencilerinin beslenme alı kanlıkları ile özyeterlilik ve iyimserlik ili kisi: Ankara Üniversitesi örne i. Yayınlanmamı yüksek lisans tezi. Ankara Üniversitesi, Ankara.
 32. Küçükkömürler G, Saime M. Üniversite Ö rencileri Karbonhidrat Tüketimi ve BK De erlerinin ncelenmesi. *Elektronik Türkçe Çalışmaları*, 2020; 15 (3): 1889-1904.
 33. Powell PK, Lawler S, Durham J, Cullerton K. The food choices of US university students during COVID-19. *Appetite*, 2021; 161: 105130. doi: 10.1016/j.appet.2021.105130
 34. Błaszczyk-B benek E, Jagielski P, Bolesławska I, Jagielska A, Nitsch-Osuch A, Kawalec P. (2020). Nutrition behaviors in polish adults before and during COVID-19 lockdown. *Nutrients*, 12(10): 3084. doi: 10.3390/nu12103084
 35. Serin E, Koç MC. (2020). Examination of the eating behaviours and de-pression states of the university students who stay at home during the coronavirus pandemic in terms of different variables. *Prog Nutr*, 22(1): 33 43. doi: 10.23751/pn.v22i1-S.9780
 36. Chi X, Liang K, Chen ST, Huang Q, Huang L, Yu Q, et al. (2021). Mental health problems among Chinese adolescents during the COVID-19: The importance of nutrition and physical activity. *International Journal of Clinical and Health Psychology*, 21(3): 100218. doi: 10.1016/j.ijchp.2020.100218
 37. Rodriguez-Besteiro S, Tornero-Aguilera JF, Fernández-Lucas J, Clemente-Suárez VJ. (2021). Gender differences in the covid-19 pandemic risk perception, psychology and behaviors of spanish university students. *International Journal of Environmental Research and Public Health*, 18(8): 3908. doi: 10.3390/ijerph18083908

Correspondence:

Hatice Baygut
 Süleyman Demirel University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Isparta, Turkey
 Phone: +90 505 30 40 888
 E-mail: haticebaygut07@gmail.com
 ORCID: 0000-0003-1703-1420