Original Article / Araştırma Makalesi

EVALUATION OF NUTRITIONAL HABITS OF UNIVERSITY STUDENTS: A CROSS-SECTIONAL STUDY DURING THE COVID-19 PANDEMIC

Üniversite Öğrencilerinin Beslenme Alışkanlıklarının Değerlendirilmesi: KOVID-19 Pandemisi Sırasında Kesitsel Bir Çalışma

Zeynep UZDİL[1] *Seda KAYA[2]* *Funda Pınar ÇAKIROĞLU[3]*
[1]Ondokuz Mayis University, Faculty of Health Sciences, Samsun
[2,3]Ankara University, Faculty of Health Sciences, Ankara

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ABSTRACT

In this study, it has been aimed to evaluate nutritional status of university students during pandemic. In this cross-sectional study, 354 university students who were aged between 18-25 years were included. Students were contacted via an online questionnaire. Demographic characteristics, meal consumption, changes in food consumption, use of nutritional supplements and anthropometric measurements (body weight, body height) were questioned with a questionnaire form. 309 women (87,30%) student and 45 male (12,70%) student were included to the study. The most commonly used nutritional supplements were multi-vitamin/mineral and vitamin C (5,60% and 2,50%, respectively). Students stated that they changed the consumption of fatty and sugary foods and beverages in the pandemic. More than half of the students increased consumption of dark green vegetables (51,10%), fruit (fresh) (59,60%) and tea (54,80%). They skipped breakfast and snacks less, and skipped lunch more when compared to prepandemic period. More than half of them stated that they cleaned food and food packagings (78,50%), and made most of their food shopping (95,20%) from the grocery store. During the pandemic, it was determined that there were changes in the nutritional habits of the majority of university students, especially about the foods they preferred and their cleaning practices for foods.

Keywords: COVID-19, Nutrition, University Students

ÖZ

Bu çalışmada, üniversite öğrencilerinin pandemi sırasında beslenme durumlarının değerlendirilmesi amaçlanmıştır. Kesitsel nitelikte olan bu araştırmaya, 18-25 yaş arası 354 üniversite öğrencisi dâhil edilmiştir. Öğrencilerle çevrimiçi bir anket aracılığıyla iletişime geçilmiştir. Anket formu ile demografik özellikler, öğün tüketimleri, beslenme alışkanlıklarındaki değişiklikler, besin takviyesi kullanımları ile antropometrik ölçümleri (vücut ağırlığı, boy uzunluğu) sorgulanmıştır. Çalışmaya 309 kadın (%87,30) ve 45 erkek (%12,70) öğrenci dâhil edilmiştir. En sık kullanılan besin takviyeleri multi-vitamin/mineral ve C vitamini (sırasıyla %5,60 ve %2,50) idi. Öğrenciler pandemi sırasında yağlı ve şekerli yiyecek ve içecek tüketimini değiştirdiklerini ifade etmiştir. Öğrencilerin yarısından fazlası koyu yeşil sebze (%51,10), meyve (taze) (%59,60) ve çay (%54,80) tüketimini arttırmıştır. Pandemi öncesi ile kıyaslandığında, kahvaltı ve ara öğünleri daha az, öğle öğününü daha çok atlamışlardır. Yarısından fazlası gıda ve gıda ambalajlarını temizlediklerini (%78,50) ve alışverişlerinin çoğunu (%95,20) marketten yaptıklarını belirtmiştir. Pandemi sırasında üniversite öğrencilerinin büyük çoğunluğunun beslenme alışkanlıklarında, özellikle tercih ettikleri besinlerde ve besinleri temizleme uygulamalarında değişiklik olduğu belirlenmiştir.

Anahtar kelimeler: Beslenme, KOVİD-19, Üniversite Öğrencileri

Zeynep UZDİL✉, zuzdil1010@hotmail.com
Ondokuz Mayis University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Samsun

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INTRODUCTION

Coronavirus disease (COVID-19) first appeared in Wuhan, China, in December 2019 and has caused numerous deaths and economic losses worldwide (Aldridge et al., 2020; Nicola et al., 2020). The number of confirmed cases worldwide has been reported as 63,719,213 million according to World Health Organization (WHO) on 3th December, 2020 (2020a). In Turkey, on 3th December, 2020; 520,167 cases has been identified and 14,316 patients died from the COVID-19 (Republic of Turkey Health Ministry, 2020). Considering the rate of spread of the COVID-19 pandemic, this is a major cause of morbidity and mortality across the globe (Calder, Carr, Gombart, & Eggersdorfer, 2020). The mortality and morbidity rate of COVID-19 varies significantly by country, race, and socioeconomic status. The differences are believed to be due to various factors such as medical systems, age, chronic diseases, and a weak immune structure (Grant et al., 2020).

Undoubtedly, vaccinations can be effective mechanisms to protect against infectious diseases. However, vaccines can take years to create and there is currently no effective vaccine for COVID-19 recommended by the World Health Organization. A number of standard public health practices have been advised to prevent from COVID-19, such as regular hand washing, avoiding those with symptoms of infection, and mask use (Calder et al., 2020). Another measure implemented to control the current COVID-19 and reduce the person-to-person transmission is to provide social isolation and the law/limits of quarantina with the closure of schools / universities and businesses (Parmet & Sinha, 2020). In our country, universities have started online education on 16th March, 2020 (YÖK, 2020).

Often lacking in public health discussions about immunity and infection is, nutritional strategies that support optimal function of the immune system. Decreased immunity is an important risk factor for infection with respiratory viruses. A good nutritional status is considered as an important factor for an optimal immune response to prevent infections (Calder et al., 2020). Staying at home for a long time can increase the consumption of tasty meals, snacks and alcohol. Increased cooking or buying prepared food more often can affect individuals. A healthy and balanced diet is an integral part of a personal risk management strategy during the COVID-19 pandemic (Gasmi et al., 2020). The World Health Organization publishes informative publications and makes recommendations on the importance of healthy nutrition in the period of quarantine and social isolation. These recommendations are; choosing home cooking, restricting sugar, restricting salt, restricting fat intake, increasing fiber intake, drinking enough water, not drinking alcohol, or taking it to

moderate levels (Muscogiuri, Barrea, Savastano, & Colao, 2020; WHO, 2020b). Inadequate and unbalanced nutrition during this period not only poses a risk for chronic diseases in the future, but also increases the risk especially in terms of immunity in the COVID-19 pandemic. Therefore, in this study, it was aimed to investigate the nutritional habits of university students during COVID-19 pandemic.

MATERIAL AND METHOD

Study Design & Subjects

This cross-sectional study was conducted among university students living in Turkey, between October and November 2020. An online questionnaire was used to collect data. Before participating in the study, the students were informed and their voluntary consents were obtained. A total of 380 students were reached online and 26 of them were excluded from the study because of the student's postgraduate degree. The data of 354 university students aged between 18-25 years were analyzed. Helsinki Declaration principles were applied, voluntary consent of the participants was obtained online and ethical permission was taken from Ondokuz Mayıs University Clinical Research Ethics Committee for conducting the study (date: 08.10.2020, decision number B.30.2.ODM.0.20.08/594).

Questionnaire form including demographic characteristics, nutritional status and anthropometric measurement was applied online using e-mail and social communication. Body mass index (BMI) was calculated by using the "weight (kg)/height^2(m)" equation and it was classified based on the BMI classification of the World Health Organization for adults (WHO, 2004). According to WHO classification, BMI is accepted as; <18,5 kg/m^2: underweight, 18,5-24,9 kg/m^2: normal, 25,0-29,9 kg/m^2: overweight, ≥30,0 kg/m^2: obese.

Statistical Analysis

SPSS (Statistical Package for the Social Sciences) 21.0 statistical package program was used to analyze the data. Continuous data were given as mean ($\bar{x}$) and standard deviation (SD) and categorical data were given as number (n) and percentage (%). McNemar test was used to compare two dependent groups. $p < 0,05$ was considered statistically significant.

RESULTS

A total of 354 students, 309 women (87,30%) and 45 male (12,70%) between the ages of 18-25 years, were included in the study. The average age of the students is 20,95±1,90 years. It has been determined that 14,10% of the students had smoking habit. The average

BMI of the students is 22,18 ± 3,99 kg/m^2 and 70,30% of BMI is normal. The distribution of individuals' demographic characteristics is shown in Table 1.

Table 1. Distribution of Students' Demographic Characteristics

Demographic characteristics	**n**	**%**
Gender		
Women	309	87,30
Men	45	12,70
Smoking		
Yes	50	14,10
No	304	85,90
BMI classification		
Underweight	43	12,30
Normal	249	70,30
Overweight	51	14,40
Obese	11	3,00
	x̄	**SD**
BMI (kg/m^2)	22,18	3,99
Age (years)	20,95	1,90
Number of people living in the house	4,27	0,86

BMI: Body Mass Index

The use of nutritional supplements during the pandemic is shown in Table 2. It has been determined that individuals use nutritional supplements such as fatty acids (omega 3), various vitamin-minerals (multi-vitamin/mineral, vitamin B12, vitamin C, vitamin D, and zinc), beta glucan, black seed oil, elderberry and propolis. The most commonly used nutritional supplements were multi-vitamin/mineral and vitamin C (5,60% and 2,50%, respectively).

Table 2. Distribution of Students' Nutritional Supplements Usage During the Pandemic

	Using		**Non-using**	
Nutritional supplements	**n**	**%**	**n**	**%**
Total	31	8,8	323	91,20
Omega 3	5	1,40	349	98,60
Multi-vitamin/mineral	20	5,60	334	94,40
Vitamin B_{12}	1	0,30	353	99,70
Vitamin C	9	2,50	345	97,50
Vitamin D	4	1,10	350	98,90
Zinc	2	0,60	352	99,40
Beta glucan	1	0,30	353	99,70
Black seed oil	2	0,60	352	99,40
Elderberry	1	0,30	353	99,70
Propolis	5	1,40	349	98,60

The change in the individuals' food consumption during the pandemic is shown in Table 3. When the consumption of foods is considered, it is seen that; more than half of the students' consumption of meat-egg-legumes, dairy products and rice-pasta in the cereals group did not change, while there was a change in the consumption of fatty and sugary foods,

and beverages. Dark green vegetables (51,10%), fruit (fresh) (59,60%) and tea (54,80%) consumption have been reported to increase by more than half of the students.

Table 3. Change in the Student's Food Consumption During the Pandemic

	Increased		**Decreased**		**Unchanged**	
Foods	**n**	**%**	**n**	**%**	**n**	**%**
Meat-Egg-Legume Products						
Fish	50	14,10	46	13,00	258	72,90
Meat	117	33,00	46	13,00	191	54,00
Legume	125	35,40	20	5,60	209	59,00
Poultry	104	29,40	53	15,00	197	55,60
Egg	163	46,00	30	8,50	161	45,50
Vegetables and Fruits						
Other Vegetables	152	42,90	12	3,40	190	53,70
Dark Green Vegetables	181	51,10	14	4,00	159	44,90
Fruit (dry)	73	20,60	28	7,90	253	71,50
Fruit (fresh)	211	59,60	14	4,00	129	36,40
Dairy Products						
Kefir	27	7,60	28	7,90	299	84,50
Cheese	116	32,80	21	5,90	217	61,30
Milk	86	24,30	27	7,60	241	68,10
Yoghurt	138	39,00	22	6,20	194	54,80
Cereals						
Bread	114	32,20	65	18,40	175	49,40
Rice-pasta	104	29,40	57	16,10	193	54,50
Fatty and sugary foods						
Cake-cookie	180	50,90	49	13,80	125	35,30
Nuts-seeds	116	32,80	36	10,20	202	57,00
Dessert	152	42,90	35	9,90	167	47,20
Beverages						
Tea	194	54,80	23	6,50	137	38,70
Coffee	121	34,20	58	16,40	175	49,40
Water	156	44,10	50	14,10	148	41,80

The distribution of meal skipping and meal consumption of individuals is shown in Table 4. It was determined that the individuals skipped the breakfast and snacks less ($p<0,001$) and skipped the lunch more ($p=0,003$) during the pandemic when compared with prepandemic period.

Table 4. The Distribution of Skipping Meals and Meal Consumption of Student's

	Prepandemic		**During pandemic**		***p***
Skipping meals	**n**	**%**	**n**	**%**	
Breakfast	78	22,00	60	16,90	0,067
Lunch	135	38,10	169	47,70	**0,003***
Dinner	11	3,10	8	2,30	0,607
Snacks	206	58,20	112	31,60	**<0,001***

***p<0.05**

Place of food shopping during the pandemic is shown in Figure 1. It has been determined that individuals do most of their food shopping (95,20%) from the grocery store.

Figure 1. Place of Food Shopping During the Pandemic

Students' food cleaning and food packaging procedure before placing them at home is shown in Figure 2. More than half of the students clean the food and food packagings (78,50%).

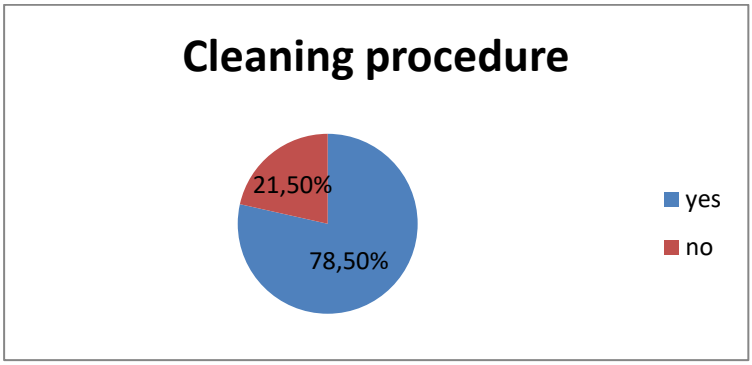

Figure 2. Cleaning Food and Food Packaging Procedure

DISCUSSION

Nutritional approaches are among the most important factors to increase immunity of both the individual and the society in the COVID-19 pandemic (Naja & Hamadeh, 2020). Therefore, in this study, it has been planned to investigate the university students' attitudes and habits of nutrition during the COVID-19 pandemic in Turkey, and it was found that there are differences in the dietary habits of university students. Significant changes were found in nutrient preferences and number of meals. In this study involving 309 women and 45 male students, it was found that approximately 17,40% of the students were overweight or obese (Table 1). It was determined that the most common supplements used by the students were

multivitamins and vitamin C (Table 2). A cross-sectional study with first and emergency aid students, Akyol and Çelik (2020) found that the use of vitamin-mineral supplements has increased in both men and women (Akyol & Çelik, 2020). Garipoğlu and Bozar (2020) determined that individuals mostly used vitamin C, vitamin D and multivitamin supplements in COVID-19 pandemic (Garipoğlu & Bozar, 2020). Similarly, in another study conducted in Turkey, adults were detected to use multivitamins, vitamin C, and vitamin D mostly in pandemics (Kaya, Uzdil, & Cakıroğlu, 2020). Several vitamins, including vitamins A, B_6, B_{12}, C, D, E and folate; and trace elements such as zinc, iron, selenium, magnesium and copper play important and complementary roles in supporting both innate and adaptive immune systems. Deficiencies in micronutrients negatively affect immune function and may reduce resistance to infections (Carr & Maggini, 2017; Gombart, Pierre, & Maggini, 2020). Especially vitamin C and vitamin D play an effective role on the immune system. Effects of vitamin C on the immune system include supportment of the; epithelial barrier function, growth and function of both innate and adaptive immune cells, white blood cell migration to infection sites, phagocytosis and microbial killing, and antibody production (Carr & Maggini, 2017). For this reason, it is thought that individuals' usage of vitamins and minerals has increased during pandemic.

In this study, it was found that the consumption of dark green vegetables, fresh fruit and tea have increased by the students. Akyol and Çelik (2020) determined that there was more change in the diet of women compared to men during the pandemic, although there was no significant difference according to gender (Akyol & Çelik, 2020). Gallo et al. (2020) found that women in Australia during the COVID-19 outbreak had about 20% higher energy intake in 2020 when compared to previous years, and had increased snack frequency which were high in calories (L. A. Gallo, T. F. Gallo, Young, Moritz, & Akison, 2020). In the study of Garipoğlu and Bozar (2020), it was found that the consumption frequency of vegetables and fruits during the pandemic increased 35,80% and 37,30%, respectively, and tea consumption increased 78,00% (Garipoğlu & Bozar, 2020). It was determined that university students skipped breakfast and snacks less and skipped lunch more frequently in the pandemic (Table 4). Most of the students consume two main meals during the COVID-19 pandemic. In a study conducted with adults in Karaman province, it was determined that 29,80% of individuals consume two meals (A. Dilber & F. Dilber, 2020). In the other study conducted with first aid and emergency aid students, it was determined that 26,80% of the students skipped lunch and 38,2% of the students had two meals (Gençalp, 2020). Similar to the literature, it was concluded that university students staying at home may skip lunch due to changes in sleep

time and having breakfast late. In addition, it was found that 78,50% of the students applied cleaning to the products they bought. SARS-CoV-2 virus can survive from 3 hours to 72 hours on various surfaces such as plastic, stainless steel, copper, cardboard and aerosols (van Doremalen et al., 2020). Therefore, it is thought that students attach more importance to hygiene and cleaning applications.

Although this study provides an insight into how the pandemic may affect students' eating habits and dietary patterns, there are some limitations to underline. First, the research which is based on an anonymous online survey excludes the possibility of verifying data for objective reasons. BMI was not measured by dietitians in quarantine, but was reported by the respondents. Therefore, it should be treated as a rough estimate, not an exact value. Moreover, the study used a simplified approach to provide an overview of the frequency of consumption of foodstuffs.

In conclusion, the present study indicates that during the pandemic, a significant percentage of university students can experience modification of dietary habits, manifested by eating and cleaning applications. During the COVID-19 pandemic, recommendations (such as not shopping when hungry, starting individual physical activities, consulting experts on nutrition) for a lifestyle that can be applied at home should be determined to protect students' physical and mental health and to develop healthy eating habits. Considering the frequency of phone, computer and internet use of university students, trainings and approaches that increase the motivation of nutrition can be developed.

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