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Evaluation of The Effect of Food Insecurity on Mental Health and Sleep Quality among University Students

Üniversite Öğrencilerinde Besin Güvencesizliğinin Mental Sağlık ve Uyku Kalitesi Üzerine Etkisinin Değerlendirilmesi

Kübra Kişioğlu Kekeç[1], Sema Çalapkorur[2*]

[1] Nevşehir City Hospital, Nevşehir, Türkiye.

[2] Erciyes University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Kayseri, Türkiye. ror.org/047g8vk19

* Corresponding author / Sorumlu yazar: dyt_sema@hotmail.com

ABSTRACT

Aim: This study was conducted to evaluate food insecurity among university students and its impact on students' mental health and sleep quality.

Material and Methods: The study was carried out in the Hünkâr Student Dormitory located in Nevşehir. Sociodemographic characteristics of the students were obtained through a survey form and anthropometric measurements were taken. Food insecurity was assessed with the 'Household Food Accessibility Scale Short Form'; mental health status with the 'Warwick- Edinburgh Mental Well-Being Scale (WEMIOS)' and sleep quality was evaluated with the 'Pittsburgh Sleep Quality Index (PSQI)'. In order to determine the students' nutritional consumption, three-day food consumption records were taken.

Results: The study was conducted with the participation of a total of 370 students, 68.9% of whom were girls and 31.1% of whom were boys. While 42.7% of the students have food insecurity; it was determined that 33.5% had moderate problems in accessing food and 8.9% had severe food insecurity. It was determined that there was a negative relationship between food insecurity and mental health score ($r=-0.132$; $p<0.05$), and a positive relationship between PSQI score ($r=0.219$; $p<0.05$). At the same time, it was observed that the consumption of energy, fat, vitamin A, carotene, vitamin K, sodium, potassium, magnesium, phosphorus and zinc in students without food security was less than those with food security ($p<0.05$).

Conclusion: It has been determined that the rate of food insecurity is high among university students and that this situation causes negative consequences in terms of mental health and sleep quality.

Keywords: Food insecurity, mental health, sleep quality, university students.

ÖZ

Amaç: Bu çalışma, üniversite öğrencilerinde besin güvencesizliği durumu ve bu durumun öğrencilerin mental sağlığı ve uyku kalitesi üzerine etkisini değerlendirmek amacıyla yürütülmüştür.

Gereç ve Yöntemler: Çalışma, Nevşehir ilinde bulunan Hünkâr Öğrenci Yurdunda gerçekleştirilmiştir. Öğrencilerin sosyodemografik özellikleri anket formu ile elde edilmiş ve antropometrik ölçümleri alınmıştır. Besin güvencesizliği 'Hane Halkı Besine Ulaşılabilirlik Ölçeği Kısa Formu'; mental sağlık durumu 'Warwick-Edinburg Mental İyi Oluş Ölçeği (WEMİOÖ)' ve uyku kalitesi 'Pittsburg Uyku Kalitesi İndeksi (PUKİ)' ile değerlendirilmiştir. Öğrencilerin besin tüketimlerinin belirlenebilmesi için 3 günlük besin tüketim kayıtları alınmıştır.

Bulgular: Çalışma, %68,9'u kız ve %31,1'i erkek olmak üzere toplam 370 öğrencinin katılımı ile gerçekleştirilmiştir Öğrencilerin %42,7'sinde ise besin güvencesizliği mevcut iken; %33,5'inin besine erişmekte orta derecede problem yaşadığı ve %8,9'unun şiddetli besin güvencesizliği olduğu belirlenmiştir. Besin güvencesizliği ile mental sağlık puanı arasında negatif yönlü ($r=-0,132$; $p<0,05$), PUKİ skoru arasında ise pozitif yönlü ilişki olduğu tespit edilmiştir ($r=0,219$; $p<0,05$). Ayrıca besin güvencesi olmayan öğrencilerde enerji, yağ, A vitamini, karoten, K vitamini, sodyum, potasyum, magnezyum, fosfor, çinko tüketiminin besin güvencesi olanlardan daha az olduğu görülmüştür ($p<0,05$).

Sonuç: Üniversite öğrencilerinde besin güvencesizliği oranının yüksek olduğu ve bu durumun mental sağlık ve uyku kalitesi açısından olumsuz sonuçlara neden olduğu tespit edilmiştir.

Anahtar kelimeler: Besin güvencesizliği, mental sağlık, uyku kalitesi, üniversite öğrencileri.

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INTRODUCTION

Food security is defined as having physical, social and economic access at all times to sufficient, safe and nutritious food that meets people's dietary needs and food preferences for an active and healthy life (1). The United States Department of Agriculture (USDA) states that food insecurity occurs when a person does not have regular access to enough safe and nutritious food for normal growth and development and for an active and healthy life. The USDA classifies food insecurity along a continuum. According to this classification, those who are highly food secure have consistent access to adequate amounts of food. Those who are marginally food secure experience concerns about food adequacy but still have access to desirable nutrients. Individuals with low food security experience a reduction in the quality, diversity and desirability of their dietary choices, but show little or no evidence of reduced nutrient intake. Finally, individuals experiencing very low food security show many signs of reduced food intake. Reduced food intake is characterized by reduced meal frequency or reduced meal content (2).

Food insecurity is a major public health problem affecting almost one in ten (9.8%) people worldwide (3). In the presence of food insecurity, food consumption is affected, leading to diseases such as diabetes, hypertension and obesity (4).

Food insecurity is also thought to affect mental health and sleep quality as a result of limiting access to food and lack of access to certain food groups (5-6). In addition, the consumption of nutrients also changes in the case of food insecurity (7) and it is reported that mental health and sleep quality are affected as a result of inadequate intake of these nutrients (8-9).

The prevalence of food insecurity in university students is significantly higher than in the general population (10-11). Financial inadequacy in university students increases food insecurity (12). In addition, factors such as not having enough time, tiring course schedules, and the time spent traveling to and from school also negatively affect food insecurity (12-13). Although the effects of food insecurity on mental health and sleep quality in university students have been examined separately, (14-15) it has been observed that there are limited studies in which these two conditions are addressed together (16). This study was conducted to evaluate food insecurity and its effect on mental health and sleep quality in university students living in a state dormitory. In our country, no study has been found in which these three parameters are evaluated together. Therefore, it is thought that our study will contribute to the field in this regard.

MATERIAL AND METHODS

This cross-sectional and descriptive study was conducted at Hünkar Dormitory/Nevşehir between January and December 2022. The study population was determined as students residing in the dormitory; students with any chronic disease diagnosis were not included in the study. After statistical analysis of the data, power analysis was performed using G. Power-3.1.9.7 program. Accordingly, the power of the study was 87.2% with an effect size of 0.3 and an alpha value of 0.05 for food insecurity.

For this study, approval was obtained from the Social and Human Sciences Ethics Committee of the relevant university (dated 28.12.2021- decision no:492) and study permission was obtained from Hünkar Dormitory Directorate. In addition, all individuals participating in the study were informed about the study and their written and verbal consent was obtained.

Data Collection Instruments

Demographic information of the individuals was obtained with the help of a questionnaire form; body weight and height were taken by the researchers. The students' body weight was measured with a digital scale (Aprilla, Turkey) and their height was measured with a non-stretchable tape measure. Body mass index (BMI) [weight (kg)/height (m)^2] was calculated from the weight and height measurements.

Household Food Accessibility Scale: The Household Food Accessibility Scale Short Form (HHBAS-SF) was used to determine food insecurity. The scale consists of 6 items and the total score of the scale varies between 0-6. A score of 0 indicates high food security; 1 indicates marginal food security; 2-4 indicates low food security; and 5-6 indicates very low food security/ food insecurity (17). Turkish validity and reliability studies of the form were conducted by Emiral et al (18).

Pittsburgh Sleep Quality Index: The Turkish validity and reliability study of the Pittsburgh Sleep Quality Index (PSQI) used to determine sleep quality was conducted by Ağargün et al. (19). In this scale, the person's sleep quality is evaluated based on sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping pills and daytime dysfunction. Scoring is based on 18 questions and 7 components, and each survey question is evaluated on a score between 0-3.The total score of the scale ranges from 0 to 21. A total score of 5 or less indicates that sleep quality is 'good', while a score greater than 5 indicates that sleep quality is 'poor' (20).

Warwick-Edinburgh Mental Well-being Scale: This scale was developed by Tennant et al. (21) and was used to assess mental health. There are 14 positive items in this scale. The lowest score on the scale is 14, while the highest score is 70. High scores obtained from the scale indicate mental well- being. The Turkish validity and reliability of the scale was conducted by Kendal (22).

Assessment of Food Consumption: Three-day food consumption records were taken to evaluate the food consumption status of individuals. Students were given detailed information on how to keep food consumption records and were asked to keep them for two days on weekdays and one day on weekends. According to the food consumption record, the types and amounts of foods consumed daily were determined and energy, macro and micronutrient values were calculated using the Nutrition Information Systems (BeBiS Version 7.1, Pacific Com., Istanbul, Türkiye) program prepared for Turkish foods.

Statistical Analysis

The data of the students participating in the study were analyzed with IBM SPSS 26.0 statistical package program. The assumption of data conformity to normal distribution was tested with the skewness kurtosis values. Variables conforming to normal distribution were given as mean±standard deviation and variables not conforming to normal distribution were given as median (minimum-maximum) values. One-way ANOVA was used for

comparisons of 3 or more groups with normal distribution, whereas Kruskal-Wallis test was used for those without normal distribution. The presence of a linear relationship between variables was evaluated using Pearson or Spearman Correlation analysis according to normality distribution. As a post hoc analysis, Tukey or Dunn's tests were used according to normality between groups. $p<0.05$ level was considered statistically significant.

RESULTS

The study was conducted with the participation of 370 students, 115 (31.08%) males and 255 (68.92%) females. The mean age of the students participating in the study was 20.49±2.01 and the majority (56.21%) were in the first grade. While 57.29% of the students had food security and 42.71% had food insecurity, 33.58% had moderate problems in accessing food and 8.91% had severe food insecurity (data not shown in the table). In Table 1, it was shown that anthropometric measurements of the students were according to their food security levels. Accordingly, body weight of the students showed a significant difference between the groups. While the body weight of students with marginal food security was higher (66.45±16.02), it was lower in students with severe food insecurity (57.55±10.08) (p=0.002).

The energy intake of the students was 1463.86±306.46 kcal in those with food security and 1308.69±273.22 kcal in those with severe food insecurity (p=0.039). While 61.57±16.31 g of fatwas consumed daily on average in those with food security, 53.13±16.58 g of fat was consumed in those with severe food insecurity (p=0.039). Vitamin A, carotene, vitamin K, potassium and zinc consumption were found to be different in levels of food insecurity (p=0.011) (Table 2).

Table 1. Evaluation of anthropometric measurements of students according to food security levels

	Nutritional Assurance	Marginal Food Security	Moderate Food Insecurity	Severe Food Insecurity	p
	[Mean±SD/ Median(Min-Max)]	[Mean±SD/ Median(Min-Max)]	[Mean±SD/ Median(Min-Max)]	[Mean±SD/ Median(Min-Max)]	
Length (m)*	1.70±0.10	1.69±0.8	1.67±0.9	1.66±0.09	0.68
Body Weight (kg)*	64.97±15.09[a]	66.26±16.05[a]	62.96±13.48[a,b]	57.55±10.08[b]	**0.002**
BMI (kg/m²)**	21.95 (15.35-46.57)	22.04 (16.41-38.16)	22.16 (16.41-35.01)	20.32 (16.81-29.55)	0.052

*One-Way Analysis of Variance **Kruskal Wallis-H test
***[a,b] Post hoc means that there is a difference between the groups that are found to be in common.Tukey test

Table 2. Evaluation of macro and micronutrient intake levels of students according to their nutritional security levels

	Food Security (n=139)	Marginal Food Security (n=74)	Moderate Food Insecurity (n=124)	Severe Food Insecurity (n=33)	p
	[Mean±SD/Median (Min-Max)]	[Mean±SD/Median (Min-Max)]	[Mean±SD/Median (Min-Max)]	[Mean±SD/Median (Min-Max)]	
Energy (kcal)*	1463.86±306.46[a]	1431.05±281.74[a,b]	1402.65±284.96[a,b]	1308.69±273.22[b]	**0.039**
Protein (g)*	58.49±14.90	56.59±13.18	55.46±15.75	53.58±14.69	0.228
Protein %*	16.37±2.70	16.24±2.42	16.20±3.22	16.94±3.23	0.614
Carbohydrate (g)*	165.28±43.45	166.99±35.94	162.29±39.11	150.87±33.84	0.235
Carbohydrate %*	46.01±6.47	47.88±5.67	47.42±6,75	47.36±5.57	0.145
Fat (g)*	61.57±16.31[a]	58.06±15.99[a,b]	57.56±17.59[a,b]	53.13±16.58[b]	**0.039**
Fat %*	37.62±6.72	35.95±5.69	36.40±7.22	35.88±6.21	0.228
MUFA (g)*	20.64±5.84[a]	20.15±6.77[a,b]	18.64±5.35[b]	17.90±4.70[a,b]	0.011
PUFA(g)**	11.49 (4.95-40.85)	10.41 (4.01-30.75)	10.38 (4.19-31.31)	8.95 (4.49-20.61)	0.098
SFA (g)*	22.71±6.55	22.65±8.14	21.93±6.64	21.22±5.56	0.601
Cholesterol (mg)**	236.13 (49.33-886.18)	217.62 (61.00-427.77)	230.74 (53.47-792.83)	188.03 (62.33-940.35)	0.080
Fiber (g)*	14.78±3.95	14.83±3.78	14.53±4.10	13.71±4.40	0.532
Vitamin A (µg)**	533.20[a] (182.17-4678.80)	515.22[a,b] (154.53-4391.32)	492.35[a,b] (199.18-1811.35)	473.67[b] (252.92-1175.68)	**0.032**
Carotene (mg)**	1.39[a] (0.33-24.56)	1.43[a] (0.24-24.38)	1.12[b] (0.32-7.81)	1.30[a,b] (0.32-4.05)	**0.012**
Vitamin D (µg)	**2.77 (0.55-15.52)**	**2.69 (0.37-8.50)**	**2.68 (0.24-7.38)**	**2.69 (0.40-6.33)**	0.964

Vitamin E (mg)**	9.25 (2.45-48.64)	8.55 (2.53-29.73)	8.73 (2.70-20.73)	8.35 (1.87-14.51)	0.484
Vitamin K (µg)**	44.60[a] (10.88-433.08)	40.91[a] (3.83-248.23)	33.68[b] (9.00-378.65)	40.54[a,b] (7.25-257.63)	**0.021**
Vitamin B1 (mg)*	0.66±0.17	0.64±0.17	0.62±0.16	0.58±0.17	0.067
Vitamin B2 (mg)**	0.86 (0.21-2.37)	0.83 (0.40-1.30)	0.80 (0.31-2.01)	0.72 (0.46-1.50)	0.072
Vitamin B6 (mg)*	1.01±0.32	0.96±0.34	0.94±0.33	0.87±0.30	0.121
Vitamin B12 (µg)**	2.65 (0.86-8.83)	2.54 (0.72-11.15)	2.47 (0.59-5.41)	2.61 (0.93-25.50)	0.094
Folate (µg)*	199.31±59.01	192.95±48.12	186.47±57.50	181.04±60.18	0.192
Vitamin C (mg)*	53.41±22.93	50.70±26.66	47.01±27.83	53.36±30.29	0.230
Sodium (mg)**	3296.77 (984.80-18889.30)	3237.99 (1434.33-27834.75)	3000.92 (950.33-14381.07)	2995.88 (1628.97-5728.60)	0.155
Potassium (mg)*	1786.09±467.67[a]	1753.67±505.30[a,b]	1658.06±439.51[a,b]	1551.18±448.29[b]	**0.022**
Calcium (mg)*	482.95±153.68	452.38±132.56	446.82±139.59	430.67±118.90	0.99
Magnesium (mg)*	207.31±52.49	204.95±50.48	197.37±51.81	180.65±49.19	0.42
Phosphorus (mg)*	832.85±199.86	801.93±04.02	780.37±199.39	742.12±192.75	0.54
Iron (mg)*	7,84±2,04	7,97±1,93	7.63±2.18	6.89±2.00	0.69
Zinc (mg)**	7.71[a] (2.24-13.83)	7.44[a] (3.45-11.34)	6.67[b] (3.27-20.26)	6.95[a,b] (3.96-11.06)	**0.005**
Manganese (mg)**	2.86 (1.32-10.42)	2.89 (1.44-8.05)	2.88 (1.23-9.92)	2.77 (1.07-4.59)	0.382
Tyrosine (mg)*	2105.16±545.12	1997.19±499.01	1971.98±584.33	1909.57±559.69	0.129
Tryptophan (mg)*	681.78±175.84	653.52±152.03	645.46±190.02	624.03±176.26	0.222

*ANOVA **Kruskal Wallis-H test p<0.05,***[a,b] Post hoc indicates that there is a difference between the groups in which it is found in common. Dunn's test MUFA:Monounsaturated fatty acids PUFA: Polyunsaturated fatty acids SFA: Saturated fatty acids

When the relationship between the mental well-being scale and sleep quality index scores of the students according to their food security levels was evaluated, it was determined that the sleep quality of students with severe food insecurity was worse than that of students with food security (p<0.001). At the same time, the mental health of students with moderate food insecurity was found to be worse than that of students with food security (p=0.001) (Table 3).

Table 3. Evaluation of students' scale scores according to their food security levels

	Food Security (n=139) Mean±SD	**Marginal Food Security (n=74) Mean±SD**	**Moderate Food Insecurity (n=124) Mean±SD**	**Severe Food Insecurity (n=33) Mean±SD**	**p**
Warwick-Edinburgh Mental Well-Being Scale Score	50.71±8.39[a]	45.63±10.31[b]	47.22±11.37[b]	45.76±11.49[a,b]	**0.001**
Pitssburgh Sleep Quality Index Score	6.77±2.94[a]	7.95±3.16[a,b]	7.91±3.16[b]	9.27±3.39[b]	**<0.001**

p<0.05, One-Way Analysis of Variance, ***[a,b] Post hoc indicates that there is a difference between the groups in which it is common.Tukey Test

The correlation between the scores of the household food accessibility scale and the scores of other scales is given in Table 4. There was a negative correlation between the household food accessibility scale score and the Mental Well-Being Scale score (r=-0.132; p<0.05). There is also a positive correlation between the household food accessibility scale score and the score on the PDQI (r=0.219; p<0.001). There was a negative correlation between PDQI score and Mental Well-Being Scale score (r=-0.225; p<0.001).

DISCUSSION

Food insecurity is a rapidly increasing health problem among university students. In studies conducted on the subject, the prevalence of food insecurity in university students has been reported between 37.5-54% (10,11). In this study, the prevalence of food insecurity in students was 42.7% and 8.9% had severe food insecurity (data not

shown in the table). The reasons for students experiencing more food insecurity than the general population may include low family income or living far from the university campus (23,24). In a previous study, it was reported that lack of financial resources to buy food, transportation difficulties, family history of food insecurity, students working in any job to earn money, lack of time for food shopping and food preparation, and lack of cooking skills were also reported as causes of food insecurity in students (25).

Table 5 shows the relationship between the scale scores of the students and their food consumption. A negative relationship was found between the household food accessibility scale score and energy intake (r=-0.158; p=0.02). Protein, fat, carbohydrate, MUFA and PUFA intake were also negatively associated with household food accessibility scale score (p=0.02, p=0.014). Vitamin K, vitamin A, carotene, vitamin C, vitamin B1, vitamin B2, vitamin B6, folic acid; sodium, potassium, calcium, magnesium, phosphorus, iron, zinc and tyrosine, tryptophan intake were negatively associated with household food accessibility scale score.

There was a statistically negative correlation between PSQI score and intake of fiber, vitamin K, vitamin B1, folic acid, potassium, calcium, magnesium, phosphorus, zinc and tyrosine.

A positive correlation was found between mental well-being scale score and energy, fiber, vitamin K, vitamin B1, vitamin B6 and sodium intake.

Table 4. The relationship of students' scale scores with each other

		Household Food Accessibility Scale	Pittsburg Sleep Quality Index
Warwick Edinburgh Mental	*r*	-0.132	-0.225
Well-Being Scale	*p*	0.011	**<0.001**
Pittsburgh Sleep	*r*	0.219	1
QualityIndex	*p*	**<0.001**	-
Household Food	*r*	1	0.219
Accessibility Scale	*p*	-	**<0.001**

Spearman Correlation Analysis

In our study, the effect of food security status on anthropometric measurements in students was examined. The results of studies conducted for this purpose in the literature are contradictory (26,27). In various studies conducted on women, it was reported that the prevalence of obesity increased as food insecurity increased in women; (26-28) while in a study conducted with university students, it was reported that food insecurity had no relationship with BMI in students (27). In this study, body weight of students with marginal food security was found to be higher, while that of students with severe food insecurity was found to be lower ($p<0.05$) (Table 1). While the relationship between food insecurity and obesity is explained by the increased consumption of processed foods with high energy and saturated fat content because they are cheaper (29); the results of our study show that food insecurity may also be characterized by a decrease in body weight.

Individuals with food insecurity generally have lower diet quality and are reported to have lower healthy eating index scores, lower fruit and vegetable intake and dietary diversity (30). In this study, more energy consumption and higher intakes of fat and MUFA were found in food secure students. At the same time, intakes of various vitamins and minerals were also found to be higher in food secure students compared to non-food secure students (Table 2). It is thought that the reason for this situation is that food insecure students have a more inadequate and poor quality diet than food secure students.

Food insecurity is associated with mental health problems in university students. It is reported that difficulties in food supply and access to adequate food in the future trigger anxiety and depression (31). In studies conducted on this subject, it has been observed that students' food insecurity significantly triggers anxiety, depression and stress (32,33). In this study, it was found that as the severity of food insecurity increased in students, their mental health was negatively affected ($p<0.05$) (Table 3, Table 4). Poor diet quality caused by food insecurity also negatively affects mental health. For example, insufficient consumption of fruits and vegetables and high consumption of foods with added sugar have been reported to be associated with depression and anxiety in students (9). In this study, an increase in energy, fiber, vitamin K, vitamin B1, vitamin B6, vitamin B12 and sodium consumption was found to be associated with an increase in mental health scale scores ($p<0.05$) (Table 5). In a review published on the subject, it was emphasized that balanced intake of micronutrients has effects on mental health (34). It also showed that nutrients such as folic acid, vitamin B12, vitamin B6, omega-3 fatty acids, zinc, selenium, and magnesium may be associated with a reduced risk of depression (35).

Another issue affected by food insecurity is sleep quality (9). In previous studies, food insecurity has been associated with insufficient sleep duration and poor sleep quality in university students (36,37). The results of this study are similar to the studies in the literature. It was observed that students had the best sleep quality in food security, while they had the worst sleep quality in severe food insecurity (Table 3). In parallel with these findings, it was found that as the scores obtained from the household food accessibility scale increased, PSQI scores also increased. In addition, it was found that worsening of sleep quality led to worsening of mental health ($p<0.05$) (Table 4). In studies conducted on the subject, it has been emphasized that improving sleep quality will also contribute to the mental health of individuals (38,39).

Table 5. The relationship between students' scale scores and nutrient intake levels

		Warwick Edinburgh Mental Well-Being Scalescore	Pitsburgh Sleep Quality Scale Total Score	Household Food Accessibility Scale score
Energy (kcal)*	r	0.112*	-0.083	-0.158**
	p	**0.032**	0.113	**0.002**
Protein (g)*	r	0.098	-0.094	-0.136**
	p	0.060	0.072	**0.009**
Carbohydrate (g)*	r	0.084	-0.061	-0.106*
	p	0.107	0.238	**0.042**
Fat (g)*	r	0.097	-0.063	-0.176**
	p	0.063	0.230	**0.001**
MUFA (g)*	r	0.080	-0.055	-0.162**
	p	0.122	0.292	**0.002**
PUFA (g)**	r	0.047	-0.028	-0.128*
	p	0.362	0.598	**0.014**
SFA (g)*	r	0.084	-0.026	-0.043
	p	0.108	0.612	0.407
Cholesterol (mg)**	r	0.035	-0.049	-0.120*
	p	0.498	0.352	**0.021**
Fiber (mg)**	r	0.113*	-0.106*	-0.081
	p	**0.030**	**0.042**	0.119
Vitamin A (µg)**	r	0.055	-0.059	-0.155**
	p	0.295	0.261	**0.003**
Carotene (mg)**	r	0.070	-0.040	-0.132*
	p	0.176	0.438	**0.011**
Vitamin D**	r	-0.016	0.057	-0.020
	p	0.756	0.275	0.698
Vitamin E (mg)*	r	0.047	-0.029	-0.096
	p	0.368	0.577	0.065
Vitamin K (µg)**	r	0.058	-0.105*	-0.131*
	p	0.270	**0.044**	**0.012**
Vitamin B1 (mg)*	r	0.115*	-0.126*	-0.155**
	p	**0.026**	**0.016**	**0.003**
Vitamin B2 (mg)**	r	0.057	-0.122*	-0.162**
	p	0.272	0.018	**0.002**
Vitamin B6 (mg)*	r	0.116*	-0.084	-0.142**
	p	**0.025**	0.108	**0.006**
Folate (µg)*	r	0.080	-0.109*	-0.130*
	p	0.127	**0.037**	**0.013**
Vitamin C (mg)*	r	0.085	-0.071	-0.129*
	p	0.103	0.171	**0.013**
Sodium (mg)**	r	0.104*	-0.050	-0.113*
	p	**0.046**	0.336	**0.030**
Potassium (mg)*	r	0.085	-0.126*	-0.170**
	p	0.104	**0.015**	**0.001**
Calcium(mg)*	r	0.056	-0.115*	-0.116*
	p	0.282	**0.027**	**0.025**
Magnesium (mg)*	r	0.093	-0.107*	-0.148**
	p	0.074	**0.039**	**0.004**
Phosphorus (mg)*	r	0.083	-0.123*	-0.163**
	p	0.110	**0.018**	**0.002**
Iron (mg)*	r	0.074	-0.101	-0.135**
	p	0.158	0.053	**0.009**
Zinc (mg)**	r	0.086	-0.133*	-0.188**
	p	0.098	**0.010**	**0.000**
Manganese (mg)**	r	0.026	-0.076	-0.060
	p	0.622	0.144	0.252
Tyrosine (mg)*	r	0.086	-0.102*	-0.152**
	p	0.097	**0.050**	**0.003**
Tryptophan (mg)*	r	0.095	-0.088	-0.137**
	p	0.067	0.089	**0.008**

*p<0.05, **0<0.01, Spearman's Correlation Analysis, MUFA: Monounsaturated fatty acids
PUFA:Polyunsaturated fatty acids, SFA: Saturated fatty acids

In this study, the results were consistent with the literature. Another reason for the negative impact of food insecurity on sleep quality is inadequate nutrient intake or poor nutritional quality (8). Studies have found that individuals with poor sleep quality have lower intakes of energy, protein, fat, vitamin K, vitamin B1, vitamin B2, potassium,

magnesium, iron, zinc, copper and tryptophan compared to those with good sleep quality (40,41). In this study, it was observed that intake of pulp, vitamin K, vitamin B1, folate, potassium, calcium, magnesium, phosphorus, zinc and tyrosine decreased significantly as the PSQI score increased ($p<0.05$) (Table 5). In other words, decreased intake of these nutrients negatively affects sleep quality in students.

CONCLUSION

In line with these results, it can be said that university students' access to food should be expanded in order to protect their physical and mental health and improve their sleep quality. In this regard, increasing government support to students or increasing nutrition opportunities in the dormitories where they stay for accommodation may help to improve the welfare level of students. Furthermore, it should be noted that the lower number of male participants compared to the female participants is a limitation of the study.

DECLARATIONS

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