



## THE RELATIONSHIP OF HOUSING STATUS, NUTRITIONAL HABITS AND FOOD CONSUMPTION WITH CONSTIPATION IN UNIVERSITY STUDENTS

### ÜNİVERSİTE ÖĞRENCİLERİNDE BARINMA DURUMU, BESLENME ALIŞKANLIKLARI VE BESİN TÜKETİMLERİNİN KONSTİPASYON İLE İLİŞKİSİ

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#### ABSTRACT

**Objective:** This study was conducted to investigate the relationship between university students' housing status (at home and in dormitory), eating habits and food consumption amounts with constipation.

**Method:** The study was conducted cross-sectionally with students (n=382) studying at Akdeniz University. Data including sociodemographic information and dietary habits of the participants were collected by face-to-face interview method using a questionnaire. Anthropometric measurements including height, body weight and waist circumference were taken and body mass index (BMI) was calculated. 24h dietary recall of the participants was taken by the researchers, and the Bristol defecation scale and constipation severity scale were used to evaluate the constipation status.

**Results:** The mean age of the participants was 21.5±1.48 years. The mean BMI was 21.9±3.38 kg/m<sup>2</sup>, and it was determined that about three quarters of them (75.0% female and 73.3% male) had normal BMI. In both groups, white bread, 1 serving of fruit or vegetables per day, and 1-2 servings of legumes and vegetable dishes per week were consumed predominantly. In general, approximately two-thirds of both home and dormitory students were found to have ideal colonic transit according to the Bristol Stool Scale and had a low constipation severity scale score. When individuals were evaluated according to the constipation pain scale, a significant difference was found between students living at home and dormitory (p<0.001). Although a significant difference was observed for saturated fatty acids and polyunsaturated fatty acids (p<0.05), no significant differences were found in the daily intake of other constipation-related nutrients including dietary fiber, soluble and insoluble fiber.

**Conclusion:** Although both home and dormitory students had low fiber intake, the number of individuals with slow colonic transit was low. More studies are needed to evaluate the relationship between nutrition, lifestyle and constipation by including other factors affecting constipation.

**Key Words:** Nutritional Status, Dietary Fiber, Constipation

#### ÖZ

**Amaç:** Bu çalışma, üniversite öğrencilerinin barınma durumlarının (ev veya yurt), beslenme alışkanlıkları ve besin tüketim miktarlarının konstipasyon ile ilişkisini incelemek amacıyla yapıldı.

**Yöntem:** Araştırma, Akdeniz Üniversitesinde eğitim alan (n=382) öğrenciler ile kesitsel olarak yürütüldü. Katılımcıların sosyodemografik bilgileri ve beslenme alışkanlıkları soru formu kullanılarak yüz yüze görüşme yöntemi ile toplandı. Boy uzunluğu, vücut ağırlığı ve bel çevresi gibi antropometrik ölçümler alındı ve beden kütle indeksi (BKİ) hesaplandı. Katılımcıların bir günlük geriye dönük besin tüketim kaydı, araştırmacılar tarafından alındı; konstipasyon durumlarının değerlendirilmesinde ise Bristol dışkılama skalası ve konstipasyon ciddiyet ölçeği kullanıldı.

**Bulgular:** Katılımcıların yaş ortalaması 21.5±1.48 yılı. BKİ ortalaması 21.9±3.38 kg/m<sup>2</sup> olup yaklaşık dörtte üçünün (kadın %75.0 ve erkek %73.3) normal BKİ'ye sahip olduğu belirlendi. Her iki grupta da beyaz ekmeğe, günde 1 porsiyon meyve veya sebze, haftada 1-2 porsiyon kurubaklagil ve sebze yemeği tüketimi çoğunlukta idi. Genel olarak hem evde hem de yurttaki öğrencilerin yaklaşık üçte ikisinin Bristol dışkı skalasına göre ideal kolonik geçişe sahip olduğu ve konstipasyon ciddiyet ölçeği skorunun düşük olduğu belirlendi. Konstipasyon ağrı ölçeğine göre bireyler değerlendirildiğinde evde ve yurttaki öğrenciler arasında anlamlı bir fark bulundu (p<0.001). Evde ve yurttaki öğrencilerin makro ve mikro besin öğeleri alımları karşılaştırıldığında doymuş yağ asiti ve çoklu doymamış yağ asiti için anlamlı bir fark gözlenmesine rağmen (p<0.05) diyet posası, çözünür ve çözünmez posa gibi konstipasyon ile ilişkili besin öğelerinin günlük tüketim miktarlarında fark bulunamadı (p>0.05).

**Sonuç:** Hem evde hem de yurttaki öğrencilerin posa alımları düşük olmasına rağmen yavaş kolonik geçişe sahip olan bireylerin sayısının az olduğu görülmektedir. Konstipasyonu etkileyen diğer faktörlerin de dâhil edilerek beslenme, yaşam tarzı ve konstipasyon arasındaki ilişkinin değerlendirilmesi yönünde daha fazla çalışmaya ihtiyaç duyulmaktadır.

**Anahtar Kelimeler:** Beslenme Durumu, Diyet Posası, Konstipasyon

#### Makale Bilgisi/Article Info

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## INTRODUCTION

Nutrition is the behavior of using nutrients and bioactive components required by the body in sufficient quantities to protect and improve health and to increase the quality of life. Adequate and balanced nutrition is one of the protective factors that play a role in minimizing nutrition-related health problems [1].

Childhood and youth are the periods where adequate and balanced nutrition gains particular importance in human life. Growth and development accelerate, the individual develops spiritually and gains gender characteristics, and energy and nutrient requirements increase in this period [2]. University life, which is the transition period from adolescence to adulthood, is the beginning of a new era in the life of young people in terms of nutrition, as well as in many other issues [3]. For this reason, university students are among the risk groups in terms of adequate and balanced nutrition problems. With the start of university life, newly established circles of friends, economic difficulties and accommodation conditions can bring along unhealthy and irregular eating habits, and wrong eating habits pave the way for many diseases in adulthood [2,3]. Studies show that university students do not have an adequate and balanced diet. These studies suggest that students often skip meals [3-6], economic difficulties lead to inadequate and unbalanced nutrition [3,6-8], and students staying in dormitories do not have a balanced diet due to reasons such as dormitory conditions [9], insufficient fluid intake [4,10], and inactivity [2,3-6,11,12]. This sets the scene for some health problems in students, one of which is constipation [12].

Constipation, which is one of the most common functional disorders related to the gastrointestinal system in the community, is characterized by decreased frequency of defecation, hard stools, straining, and a feeling of incomplete discharge [13,14]. In its pathogenesis, there are many lifestyle-related factors such as inactivity, low fiber consumption and socioeconomic status, as well as endocrine and metabolic problems such as genetic predisposition, hormonal imbalance, and side effects of drugs [15]. Therefore, lifestyle changes, dietary modification and physical activity play a key role in the regulation of intestinal motility [13,16]. Dietary fiber refers to components in plants, including carbohydrates and lignin, that cannot be hydrolyzed by enzymes in the human body and therefore cannot be digested by the body. Dietary fiber is divided into two main headings, water-soluble and insoluble fiber. The former is the edible part of the plant that is resistant to digestion but can be partially or completely fermented to short-chain fatty acids in the large intestine by colon bacteria. Soluble fiber creates a tight and gel structure due to its water binding property. On the other hand, insoluble fiber, which is not digested, has the capacity to absorb water, thus increasing the stool volume and shortening the transit time of the stool through the intestine [17,18]. By improving the daily dietary fiber intake, the intestinal mucosa is stimulated to secrete water and mucus, thus increasing the water holding capacity, softening the stool consistency, increasing the stool weight and decreasing the passage time of the stool through the colon [16,18]. Cereals, legumes, nuts, vegetables and fruits can be shown as good sources of dietary fiber [13,17]. Adopting a nutrition program with a high fiber content, increasing physical activities, acquiring routine toilet habits, and improving fluid consumption are among the lifestyle changes that can be made in the prevention and treatment of constipation. Based on the fact that both the nutritional habits and food consumption of university students staying at home will be different from those of students living in dormitories, this study aims to examine the relationship between university students' dietary habits and nutrient intakes and their constipation status.

## METHOD

### Participants

This cross-sectional study included 382 students studying at Akdeniz University in the academic year of 2021-2022, where there were 64335

students at the university. Based on the sample calculation of the known universe, 382 people were required to participate in the study with 95% confidence level, and 5% margin of error.

### Data Collection

Between January and April 2022, 382 students, who were studying at faculties or colleges at Akdeniz University, over the age of 18, without any disease or medication that caused diarrhea or constipation, and who agreed to participate in the study, were included in the study.

### Data Collection Tools

In the study, a questionnaire was built to question the sociodemographic information (age, gender, housing status, etc.), nutritional habits and food preferences of the participants, and it was applied to the students by face-to-face interview method. Some anthropometric measurements (body weight, height and waist circumference) of the students were also taken using the methods previously recommended by the World Health Organization. BMI is calculated and assessed in three categories with  $<18.5 \text{ kg/m}^2$  as underweight,  $18.5\text{-}24.9 \text{ kg/m}^2$  as normal, and  $25.0 \text{ kg/m}^2$  as overweight/obese [19]. One-day (24-h) dietary records of the students were taken by the investigators. "Food and Nutrition Photo Catalogue" [20] was used to define the amount of food consumed by individuals at home in a portion, and "Standard Recipes" [21] to determine the amounts of foods consumed in a portion outside home.

*Bristol Stool Scale:* Stool scale test and constipation severity scale were used to evaluate the constipation status. There are 16 questions in total in the stool scale test and constipation severity scale. Bristol Stool Scale was used as stool scale test. This scale aims to predict stool form over seven different stool shapes. According to the stool scale test, Types 3 and 4 are considered "ideal", Types 1 and 2 indicate slow colonic transit (sign of constipation), Types 5, 6 and 7 rapid colonic passage (sign of diarrhea) [22].

*Constipation Severity Scale:* Constipation severity scale includes lazy bowel syndrome, stool obstruction and pain sub-dimensions. Scores vary between 0 and 29 in lazy bowel syndrome, between 0 and 28 in stool obstruction, and between 0 and 16 in pain dimension. In this context, the lowest score that can be obtained within the scope of the Constipation Severity Scale is 0, and the highest one is 73. The high scores obtained from the scale indicate that the symptoms are severe [23].

### Ethical Approval

Prior to the conduct of study, its protocol was reviewed by the Akdeniz University Clinical Trials Ethics Committee and the ethics committee approval was obtained (22.12.2021-949) and compliance with the Declaration of Helsinki was ensured during the study. Informed consent was obtained from all participants before starting the study.

### Statistical Analysis

Descriptive statistics are presented in frequency, percentage, mean ( $\bar{X}$ ), and standard deviation (SD) values. Fisher's Exact Test or Pearson's chi-square test was used to analyze the relationships between categorical variables. Kolmogorov-Smirnov test was used for normality. Using daily food consumption records, daily energy and nutrient intakes of individuals were calculated in BeBiS program. The Mann-Whitney U test was used in the non-parametric comparison of the numerical variables of the groups, and the Independent-t test when the normal distribution assumption was met. SPSS 23.0 package software was used in all statistical analyzes and  $p < 0.05$  was accepted for statistical significance.

## RESULTS

Table 1 shows the general characteristics of the participants. The majority of the individuals (77.5%) are women, more than half (52.8%) are first- and second-year students, and the mean age of all

participants is 21.5±1.48 years. The numbers of students staying at home (49.7%) and dormitory (50.3%) are similar. Their mean body mass index (BMI) is 21.9±3.38 kg/m<sup>2</sup>.

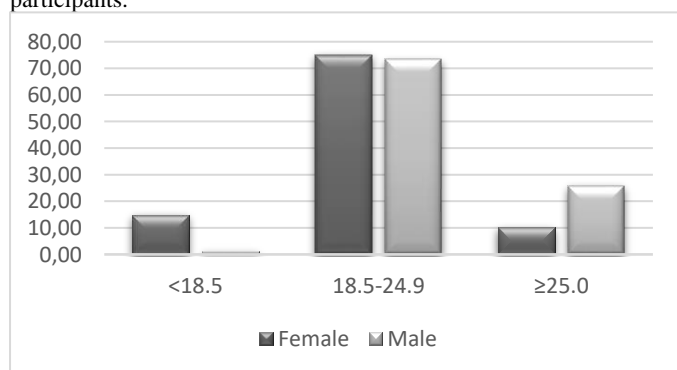
**Table 1.** General characteristics of the participants (n=382)

Characteristics		n	%
Gender	Female	296	77.5
	Male	86	22.5
Housing Status	Home	190	49.7
	Dormitory	192	50.3
	Preparatory	9	2.4
Education Status	1st grade	101	26.4
	2nd grade	101	26.4
	3rd grade	57	14.9
	4th grade	103	27.0
	≥ 5th grade	11	2.9

Variables	X±SD	Minimum-Maximum
Age (year)	21.5±1.48	19-25
Weight (kg)	62.2±12.89	40.0-120.0
Height (cm)	168±9.41	147.0-198.0
Body mass index (kg/m <sup>2</sup> )	21.9±3.38	15.5-43.5
Waist circumference (cm)	72.2±11.45	46.0-132.0

X: Average, SD: Standard Deviation

The BMI distribution of the participants by gender is given in Figure 1. The BMI of the majority of individuals in both groups is in the range of 18.5-24.9 kg/m<sup>2</sup> (75.0% female and 73.3% male, respectively). Underweight subjects (14.9%) are in the second place among female participants, and overweight/obese subjects (25.6%) among male participants.



**Figure 1.** Distribution of participants according to body mass index

Table 2 presents the consumption preferences of the subjects for foods containing fiber. Regarding the cereal consumption preferences of the participants at breakfast the percentage of the participants staying at home who consume oat flakes (29.5%) is significantly higher than those staying in dormitories (10.4%). On the other hand, the rate of dormitory residents consuming corn flakes (16.7%) and ready-packaged/patisserie products (23.4%) for breakfast is higher than those staying at home (14.2% and 17.9%, respectively) (p<0.001). Although it is statistically insignificant, the rate of individuals (26.3%) who stay at home and consume whole grain bread for meals is higher than those who stay in dormitories (19.3%) (p=0.243). The majority of both the subjects staying at home and those staying in the dormitory consume salad (7.9% and 67.7%, respectively) and 1-2 servings of legumes a week (70.5% and 70.3%, respectively) for lunch/dinner (p>0.05). The comparison of fruit and vegetable consumption of the subjects shows that although the frequency of fruit/vegetable consumption (≥2

servings/day) is higher in individuals who stay at home (33.7%), the percentage of those who consume these foods with peel is lower than that of those who stay at home (77.9%) (p=0.003). In both groups, almost all of the subjects prefer to consume vegetable dishes (p=0.735).

**Table 2.** Dietary fiber consumption preferences of individuals living at home and in dormitories

Variables	Home (n=190) n (%)	Dormitory (n=192) n (%)	χ <sup>2</sup>	p
<b>Breakfast grain consumption</b>				
Toast/sandwich white bread	60 (31.6)	81 (42.2)	2.829	0.000*
Toast/sandwich whole grain bread	13 (6.8)	14 (7.3)		
Pre-packaged/pastry products	34 (17.9)	45 (23.4)		
Oat flakes	56 (29.5)	20 (10.4)		
Corn flakes	27 (14.2)	32 (16.7)		
<b>Salad consumption at lunch/dinner</b>				
Consuming	129 (67.9)	130 (67.7)	0.002	0.969
Not consuming	61 (32.1)	62 (32.3)		
<b>Bread consumption at meals</b>				
Not consuming	36 (18.9)	37 (19.3)	2.829	0.243
Grain consumption	50 (26.3)	37 (19.3)		
White bread consumption	104 (54.7)	118 (61.4)		
<b>Frequency of legume consumption</b>				
Not consuming	14 (7.4)	15 (7.8)	1.441	0.837
1-2 servings/week	134 (70.5)	135 (70.3)		
≥ 3-4 servings/week	41 (21.6)	42 (21.9)		
<b>Consumption of vegetables in meals</b>				
Consuming	175 (92.1)	175 (91.1)	0.115	0.735
Not consuming	15 (7.9)	17 (8.9)		
<b>How to consume fruits and vegetables that can be consumed with the peel</b>				
Shelled	148 (77.9)	171 (89.1)	8.648	0.003*
Without shell	42 (22.1)	21 (10.9)		
<b>Frequency of fruit/vegetable consumption</b>				
Not consuming	19 (10.0)	26 (13.6)	10.013	0.018*
1 serving/day	107 (56.3)	126 (65.6)		
2 servings/day	45 (23.7)	33 (17.2)		
≥ 3 servings/day	19 (10.0)	7 (3.6)		

\*Chi-Square test, p<0.05

Information related to the constipation status of the subjects is given in Table 3. The Bristol defecation scale found that one out of every 10 people staying at home and in the dormitory had slow colonic transit (13.7% and 13.5%, respectively) (p=0.486). The constipation severity scale score determined that individuals staying at home (18.4±11.49) had higher scores than those staying in dormitories (17.6±10.65), which was statistically insignificant (p=0.455). The pain scale score, which is one of the components of the constipation scale, is higher in participants staying at home (1.5±2.45) than those staying in dormitories (0.7±1.48) (p<0.001). Considering poor defecation,

difficulty in defecating, and lazy bowel syndrome, scores were similar for both groups ( $p>0.05$ ).

**Table 3.** Constipation status of individuals

Variables	Home (n=190)	Dormitory (n=192)	$\chi^2$	p
<b>Bristol stool scale (n %)</b>				
Slow colonic passage	26 (13.7)	26 (13.5)		
Ideal	137 (72.1)	137 (71.4)	0.061	0.970
Rapid colonic passage	27 (14.2)	29 (15.1)		
<b>Constipation severity scale</b>				
			<i>t</i>	<i>p</i>
Score (X $\pm$ SD)	18.4 $\pm$ 11.49	17.6 $\pm$ 10.65	0.748	0.455
Inadequate defecation	5.9 $\pm$ 2.38	5.8 $\pm$ 2.15	0.473	0.637
Difficulty in defecation	5.8 $\pm$ 2.34	5.7 $\pm$ 2.05	0.462	0.644
Lazy colon	11.2 $\pm$ 5.19	10.9 $\pm$ 4.29	0.351	0.726
Pain scale	1.5 $\pm$ 2.45	0.7 $\pm$ 1.48	3.563	0.000

\*Chi-Square test \*\*Independent-t test,  $p<0.05$

Table 4 shows the daily energy and nutrient intakes of the subjects staying at home and dormitory.

**Table 4.** Differences in energy and nutrient intake of participants

Variables	Home (n=190)	Dormitory (n=192)	<i>t</i>	<i>p</i>
	X $\pm$ SD			
Energy (kcal)	1485.7 $\pm$ 790.63	1528.4 $\pm$ 725.14	-0.551	0.582
Protein (%)	16.9 $\pm$ 5.74	15.8 $\pm$ 4.89	2.081	0.038
Fat (%)	38.3 $\pm$ 8.64	39.8 $\pm$ 9.06	-1.676	0.095
Polyunsaturated fatty acids (g)	14.2 $\pm$ 9.33	17.1 $\pm$ 11.60	-2.652	0.007
Linoleic acid (g)	10.8 $\pm$ 8.40	14.4 $\pm$ 11.19	-3.664	0.000*
Linolenic acid (g)	0.9 $\pm$ 1.00	1.1 $\pm$ 1.38	-1.645	0.101
Monounsaturated fatty acids (g)	18.2 $\pm$ 10.41	21.5 $\pm$ 12.68	-2.748	0.006*
Saturated fatty acids (g)	18.3 $\pm$ 11.0	21.2 $\pm$ 13.58	-2.237	0.026*
Carbohydrate (%)	44.7 $\pm$ 9.66	44.4 $\pm$ 9.20	0.264	0.761
Dietary fiber (g)	15.8 $\pm$ 7.58	15.6 $\pm$ 9.25	0.201	0.841
Soluble fiber (g)	5.3 $\pm$ 2.82	5.3 $\pm$ 3.00	0.124	0.901
Insoluble fiber (g)	10.0 $\pm$ 4.84	9.8 $\pm$ 6.53	0.357	0.722
Cholesterol (mg)	331.9 $\pm$ 468.14	279.9 $\pm$ 269.18	1.333	0.183
Vitamin A (mg)	651.9 $\pm$ 477.38	973.4 $\pm$ 3640.47	-1.207	0.228
Vitamin E (mg)	13.3 $\pm$ 8.72	16.8 $\pm$ 11.49	-3.322	0.001
Thiamine (mg)	0.79 $\pm$ 0.41	0.77 $\pm$ 0.49	0.483	0.629
Riboflavin (mg)	1.06 $\pm$ 0.74	1.04 $\pm$ 0.67	0.256	0.798
Pyridoxine (mg)	1.2 $\pm$ 0.73	1.2 $\pm$ 1.33	-0.147	0.883
Folate (mcg)	223.1 $\pm$ 117.23	225.2 $\pm$ 132.30	-0.169	0.866
Vitamin C (mg)	74.4 $\pm$ 61.02	74.0 $\pm$ 61.30	0.059	0.953
Potassium (mg)	1943.7 $\pm$ 914.28	1911.6 $\pm$ 92353	0.341	0.733
Calcium (mg)	467.0 $\pm$ 289.24	509.7 $\pm$ 300.87	-1.413	0.158
Magnesium (mg)	218.0 $\pm$ 102.07	217.4 $\pm$ 109.53	0.052	0.959
Phosphorus (mg)	907.7 $\pm$ 504.25	885.4 $\pm$ 412.12	0.473	0.636
Iron (mg)	8.9 $\pm$ 5.07	8.8 $\pm$ 4.65	0.139	0.889
Zinc (mg)	8.3 $\pm$ 4.47	8.2 $\pm$ 4.69	0.041	0.967

\*Independent-t test,  $p<0.05$

Daily energy intakes of both groups (1458.7 $\pm$ 790.63 kcal and 1528.4 $\pm$ 725.14 kcal, respectively) were similar to each other ( $p=0.582$ ). While the contribution of daily carbohydrate and fat intake to energy is similar in students staying at home and in dormitories, the contribution of protein intake to energy is higher in those staying at home (16.9 $\pm$ 5.74%) than those staying in a dormitory (15.8 $\pm$ 4.89%) ( $p=0.038$ ), and intake of polyunsaturated fatty acids (14.2 $\pm$ 9.33 g and 17.1 $\pm$ 11.60 g, respectively), saturated fatty acids (18.3 $\pm$ 11.0 g and 21.2 $\pm$ 13.58 g, respectively), and monounsaturated fatty acids (18.2 $\pm$ 10.41 g and 21.5 $\pm$ 12.68 g, respectively) are lower for those staying at home than for those staying at a dormitory ( $p<0.05$ ). Daily dietary fiber (15.8 $\pm$ 7.58 and 15.6 $\pm$ 9.25 g, respectively) and soluble (5.3 $\pm$ 2.82 g and 5.3 $\pm$ 3.00 g) and insoluble (10.0 $\pm$ 4.84 g and 9.8 $\pm$ 6.53 g) fiber intake was similar in both groups ( $p>0.05$ ). The daily intake of vitamin E, which is a fat-soluble vitamin, is higher (16.8 $\pm$ 11.49 mg) in individuals living in dormitories ( $p=0.001$ ). Regarding water-soluble B group vitamins, vitamin C and minerals, the intake of the two groups were similar ( $p>0.05$ ).

## DISCUSSION

In this study, which was conducted to examine the relationship between the accommodation status (home or dormitory), nutritional habits and food consumption of university students, and constipation, it was found that approximately two-thirds of the students living both at home and in the dormitory had ideal colonic transit according to the Bristol stool scale and the constipation severity scale score was low. A significant difference was observed for saturated fatty acids and polyunsaturated fatty acids ( $p<0.05$ ), no significant differences were found in the daily intake of other constipation-related nutrients including dietary fiber, soluble and insoluble fiber intakes of the students staying at home and in the dormitory.

Nutrition is a notable factor for an individual to lead a healthy life. The university life is of critical importance as it is the period in which the nutritional habits of the students are settled [24]. The person who gains independence and participates in social life with the university period starts to buy food and prepare food for themselves and the tendency of skipping meals and eating out increases. For these reasons, university leads to changes in eating habits [25]. The mean BMI of the subjects in this study was 21.9 $\pm$ 3.38 kg/m<sup>2</sup>, and the majority of both women and men had normal BMI. Similar studies conducted with university students also show that the majority of individuals have normal body weight according to BMI classification [4,10,26,27]. It is thought that one of the most important reasons for this is that the majority of the study subjects are first- and second-year students who have just embarked on university life. Studies on the food consumption habits of university students show that bread, sandwiches, fresh fruit, cooked vegetables and salad are among the most commonly consumed foods [28,29]. Another similar study suggested that foods such as rice and meatless vegetable meals were frequently preferred by university students, while protein-based foods were less popular [24]. Considering the eating habits of the students participating in this study, although the consumption of bread, salad and vegetables is high, the percentage of the subjects consuming ready-made packaged products or patisserie goods for breakfast is high, and the frequency of daily fruit consumption is low. Turkey Dietary Guidelines states that 45-60% of daily energy intake should come from carbohydrates, 10-20% from proteins and 20-35% from fats for adequate and balanced nutrition [1]. Accordingly, the daily protein intake of the participants is ideal, their carbohydrate intake is at the limit, and their fat intake is above what is recommended. A study showed that the daily macronutrient intakes of university students (carbohydrate 46.6%, protein 17.4% and fat 35.9%, respectively) were similar to the results of our study [30]. Another study found that the contribution of carbohydrate intake to energy is well above the recommendations, as university students mostly prefer bread, rice, pasta and legumes in their diet [29]. The fact that the contribution of macronutrients to energy is



not at the recommended levels may lead to an increase in the future risk of chronic diseases along with the increase in body weight.

Dietary fiber is defined as the indigestible components that make up the structure of the plant cell wall. Dietary fiber, which has a laxative effect in the large intestine, can prevent constipation by increasing its water-holding capacity with its strong absorption ability [18]. It is reported that daily dietary fiber intake should be 25 g in adults and that adequate fiber intake prevents constipation [1,31]. Our study shows that the daily dietary fiber intake of the students staying both at home and in the dormitory is lower than recommended. A review of 37 studies evaluating the nutritional intake of university students reported that students' daily fiber intake was insufficient [32]. Although the fiber intake of the study subjects was low, the majority of the participants in both groups had ideal colonic transit according to the Bristol stool scale and had a low constipation severity scale score. In addition, the results of studies conducted on university students are similar to ours [12,27]. A study conducted in Turkey determined that students living in dormitories are more constipated than students living at home [33]. Another study found that 14.9% of female students living in the dormitory had constipation problems and the frequency of consumption of vegetables and fruits in constipated individuals was low [34]. Bakır and Çalapkörür also stated that the daily fiber intake of university students was low and there was no significant difference between stool colonic passage and fiber intake according to the Bristol stool scale [13]. Considering the constipation severity scale score and Bristol stool scale values in our study, most individuals in the two groups did not have any complaints about constipation. The fact that most students in both groups consume salad/vegetables for lunch and dinner, 1-2 servings of legumes per week, and 1 serving of vegetables/fruits and fruits with their peel (if they can) may have an effect on this case. In addition, the fact that more than half of the daily dietary fiber intake in both groups is composed of insoluble fiber may also have a positive effect on constipation.

Although the relationship between constipation and dietary components is generally discussed over dietary fiber intake and fluid consumption, studies have recently focused on the relationship between dietary fat ratio and colonic motility. It is stated that a high-fat diet is associated with motility disorders that result in constipation due to effects such as loss of nitrergic myenteric neurons in the proximal colon and decreased colonic mucus production [35]. One study reported a strong association between high dietary saturated fatty acid intake (>30 g/day) and diabetes and constipation in elderly individuals [36]. Our study shows that both dormitory and home-based students have a high percentage of dietary energy from fat. Although the number of subjects with slow colonic transit was low in the study, we believe that high fat intake may trigger constipation in the future.

In addition, the saturated fatty acid intake of individuals staying at home is significantly lower than those staying in dormitories; however, there is no difference between the states of constipation, which may be associated with a non-excessively high intake of saturated fat. Omega-3 polyunsaturated fatty acids are also known to have effects on inflammation and pain [37]. In our study, while the intake of polyunsaturated fatty acids of the students staying at the dormitory is significantly higher than those staying at home, the omega-3 fatty acid intakes were higher than the individuals living in the dormitories, although it was statistically insignificant. The lower pain scores in the constipation severity scale of the subjects staying in the dormitory may be related to the high omega-3 intake.

### Limitations

One of the most critical limitations of our study is the daily food consumption record. The consumption records taken through the 24-hour re-call method may have led to the inability to fully evaluate the energy and nutrient intake of the subjects. The second limitation of our study is that physical activity status and fluid consumption, which are one of the factors affecting constipation, could not be evaluated in our

study. However, the high number of participants and the fact that it is the first study to analyze the relationship between nutrition and constipation based on the housing status of university students are the strengths of our study.

### CONCLUSION

It is key for university students to acquire the right eating habits in order to maintain health both in their current and future lives. In this context, regular training on nutrition will be beneficial in eliminating deficiencies in nutritional knowledge and habits. Contrary to our hypothesis, our study does not suggest a significant difference between the constipation status of individuals staying at home and those residing at dormitories. For future studies on this subject, it is recommended to take three- or seven-day food consumption records, review the nutrient intake in more detail and investigate other factors affecting constipation.

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