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RESEARCH / ARAŞTIRMA

Evaluation and Comparison of Dietary Habits, Diet Quality, and Mental Well-Being Levels among University Students in Different Countries: The Case of Bosnia and Herzegovina and Türkiye

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ABSTRACT

Objective: The aim of this study was to evaluate and compare the dietary habits, diet quality, and mental well-being of university students in different countries.
Material and Methods: The descriptive general characteristics, disease status, dietary habits, smoking status, and alcohol consumption status of the students were recorded. In addition, the Mediterranean Dietary Adherence Scale (MEDAS) was used to assess diet quality, the Short Physical Activity Assessment Tool was used to assess physical activity levels, and the Warwick-Edinburgh Mental Well-Being Scale was used to assess mental well-being.
Results: 58% of the students in Turkey and 69.9% of the students in Bosnia and Herzegovina had a normal BMI. The percentage of students in Turkey and Bosnia and Herzegovina with high adherence to the Mediterranean diet ranged from 20.3% to 32.5%. The mental well-being scores of students in the two countries were similar, with averages of 51.7±9.3 in Turkey and 51.2±8.8 in Bosnia and Herzegovina.
Conclusion: Since university represents a critical transitional stage to adulthood, it is important to promote and support healthy behaviors during this period. Therefore, adopting and implementing nutrition and health education programs, along with increasing students' physical activity levels, is recommended to reduce the prevalence of overweight and obesity among university students and to improve their dietary habits.
Keywords: Dietary habits, mental well-being, Mediterranean diet, different countries.

Farklı Ülkelerdeki Üniversite Öğrencilerinin Beslenme Alışkanlıkları, Diyet Kalitesi ve Mental İyilik Hali Düzeylerinin Değerlendirilmesi ve Karşılaştırılması: Bosna-Hersek ve Türkiye Örneği

ÖZET

Amaç: Bu çalışmanın amacı, farklı ülkelerdeki üniversite öğrencilerinin beslenme alışkanlıklarını, diyet kalitesini ve mental iyilik halini değerlendirmek ve karşılaştırmaktır.
Gereç ve Yöntem: Öğrencilerin tanımlayıcı genel özellikleri, hastalık durumu, beslenme alışkanlıkları, sigara kullanımı ve alkol tüketim durumları kaydedilmiştir. Ayrıca, diyet kalitesini değerlendirmek için Akdeniz Diyetine Uyum Ölçeği (MEDAS), fiziksel aktivite düzeylerini değerlendirmek için Kısa Fiziksel Aktivite Değerlendirme Aracı ve mental iyilik halini değerlendirmek için Warwick-Edinburgh Mental İyilik Hali Ölçeği kullanılmıştır.
Bulgular: Türkiye'deki öğrencilerin %58'i ve Bosna-Hersek'teki öğrencilerin %69,9'u normal bir beden kütle indeksine sahipti. Türkiye ve Bosna-Hersek'te Akdeniz diyetine yüksek uyum gösteren öğrencilerin oranı sırasıyla %20,3 ve %32,5'ti. İki ülkedeki öğrencilerin mental iyilik hali puanları benzerdi (Türkiye: 51,7 ± 9,3, Bosna-Hersek: 51,2 ± 8,8).
Sonuç: Üniversite dönemi, yetişkinlik hayatına geçişte önemli bir aşama olduğu için bu dönemde sağlıklı davranışların geliştirilmesi ve desteklenmesi önemlidir. Bu nedenle, üniversite öğrencileri arasında fazla kilo ve obezite prevalansını azaltmak ve beslenme alışkanlıklarını iyileştirmek için beslenme ve sağlık eğitimi programlarının benimsenmesi ve uygulanması, ayrıca fiziksel aktivite düzeylerinin artırılması önerilmektedir.
Anahtar Kelimeler: Akdeniz diyeti, beslenme alışkanlıkları, farklı ülkeler, mental iyilik hali.

1. Introduction

University is a critical period during which young adults begin to make their own decisions about their dietary habits, which often persist into adulthood and affect health (1-3). Since unhealthy behaviors acquired both psychologically and physically during this period lead to an increase in obesity, noncommunicable diseases, and psychological disorders in adulthood, it is highly important for young adults to adopt healthy behaviors (4).

Many studies have shown that university students have unhealthy dietary habits and that their consumption of saturated fat, cholesterol, and overall fat, as well as their consumption of sugary drinks and fast food, increases, whereas their consumption of milk, dairy products, fruits, and vegetables decreases, especially during this period (5-7). In a study evaluating the adherence of university students to the Mediterranean diet, 25.6% of the students were found to have inadequate adherence (8). In another study, this rate was 24.0% (9).

Physical inactivity is among the unhealthy practices observed in this age group (7,10,11). The transition from high school to university involves significant changes in students' home, work, and leisure environments. These changes often leads to risky

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behaviors, such as increased alcohol consumption and a lack of physical activity (12,13). University students may adopt a more sedentary lifestyle, especially due to the long hours of study required for academic success (14,15). One study reported that the prevalence of physical inactivity is much higher among university students than the world average (16). A meta-analysis revealed that university students spend an average of 7.29 hours per day sitting (17). Similarly, Edelmann et al. (2022) reported high levels of sedentary behavior and physical inactivity in university students (18).

Universities present students with new challenges, such as making independent decisions about their lives and studies, adjusting to academically demanding study environments, and interacting with a diverse range of new people. In addition, many students have to leave home, often for the first time, and move away from the familiar environment of family and friends (19). These challenges put pressure on the mental health of higher education students, adversely affecting their mental well-being (20). Furthermore, the prevalence of common psychological problems such as depression, anxiety, and stress increases throughout adolescence and peaks in early adulthood, around the age of 25 (21), which makes university students a particularly vulnerable population (19).

People's dietary habits are shaped by the social and cultural environments in which they live and to which they belong; therefore, the ideal diet may vary across cultures. Cross-cultural comparisons can provide valuable insights that enhance awareness of different health belief systems and dietary habits among groups (22). The aim of this study was to evaluate and compare the dietary habits, diet quality, and mental well-being of university students studying in different countries.

2. Material and Method

2.1. Study Design and Sample Selection

This study was conducted between July and October 2023 with students from a university in Sarajevo, Bosnia and Herzegovina, and a university in Istanbul, Türkiye. A total of 81 university students from Sarajevo and 69 university students from Istanbul participated in the study. The study was conducted with university students who agreed to participate in the survey, and individuals who were not university students were excluded from the study.

A priori power analysis was performed using G*Power. The analysis was based on a two-tailed independent samples t-test with an effect size of d = 0.50, α = 0.05, and a power of 0.80. The required sample size was calculated as 128 participants in total (64 per group).

2.2. Data Collection

An online questionnaire was used to collect the data from the students included in the study. Voluntary consent was obtained from those who agreed to participate in the study at the beginning of the questionnaire, in accordance with the Declaration of Helsinki. In the questionnaire, descriptive general characteristics, disease status, dietary habits, smoking and alcohol consumption, physical activity levels, adherence to the Mediterranean Diet, and mental well-being were assessed.

2.2.1. Assessment of dietary atterns

The dietary patterns of the students were evaluated according to the Mediterranean diet. For this purpose, the 14-item Mediterranean Diet Adherence Screener (MEDAS), developed by Martínez-González et al. (2012) in the PREDIMED study, was used (23,24). Each question is scored as 1 or 0 depending on the individual's food consumption, and the total score is then calculated. A total score of 7 or above indicates that the individual has "moderate" adherence to the Mediterranean diet, and a score of 9 or above indicates that the individual has "high" adherence to the Mediterranean diet (25,26).

2.2.2. Assessment of Physical Activity

To evaluate the physical activity levels of the participants, a two-question short physical activity assessment tool was used. The total score obtained from these two questions was calculated; a score of 0-3 was considered "insufficiently active", and a score of four or higher was considered "sufficiently active" (27).

2.2.3. Assessment of Mental Well-Being

The Warwick-Edinburgh Mental Well-Being Scale was developed by Tennant et al. (28). This 14-item scale uses 5-point Likert-type questions, yielding a total score ranging from 14 to 70. Higher scores indicate greater mental well-being.

2.2.4. Analysis of Research Data

The data obtained from the questionnaire were analysed using the Statistical Package for the Social Sciences (SPSS) version 21.0. The Mann–Whitney U test was used to compare means that were not normally distributed. The chi-square test was used to compare other data in the study. Statistical significance was set at $p<0.05$.

Table 1. General characteristics of participants by country

	Türkiye		Bosnia and Herzegovina	
	n	%	n	%
Gender				
Female	62	89.9	74	89.2
Male	7	10.1	9	10.8
Marital status				
Single	67	97.1	72	86.7
Married	2	2.9	11	13.3
Mother's education level				
Primary-secondary school	34	49.3	10	12.0
High School	15	21.7	39	47.0
University	18	26.1	30	36.1
Postgraduate	2	2.9	4	4.8
Father's education level				
Primary-secondary school	25	36.2	3	3.6
High School	21	30.4	47	56.6
University	18	26.1	28	33.7
Postgraduate	5	7.2	5	6.0
Total revenue				
Below minimum wage	3	4.3	3	3.6
Minimum wage	4	5.8	5	6.0
Above minimum wage	62	89.9	75	90.4
Smoking				
Not smoking	55	79.7	63	75.9
1-5 pieces	5	7.2	7	8.4
6-10 pieces	4	5.8	3	3.6
10-20 pieces	5	7.2	9	10.8
More than 1 packet	0	0.0	1	1.2
Alcohol consumption				
Not drinking	51	73.9	58	69.9
1-2 units per day	1	1.4	0	0.0
1-2 units per week	2	2.9	9	10.8
More than 2 units per week	0	0.0	0	0.0
1-2 units per month	15	21.7	16	19.3
Disease				
No	49	71.0	66	79.5
Cardiovascular diseases	3	4.3	2	2.4
Diabetes	3	4.3	6	7.2
Hypertension	0	0.0	3	3.6
Kidney diseases	1	1.4	1	1.2
Gastrointestinal tract disease	4	5.8	2	2.4
Gynecological diseases	1	1.4	4	4.8
Autoimmune disease	13	18.8	4	4.8

2.4. Ethical Aspects of the Research

The Non-Interventional Clinical Research Ethics Committee of Istanbul Medipol University approved the study protocol with decision number 550 on 22 June 2023.

3. Results

The demographic characteristics of the participants by country are presented in Table 1. The mean age of the Turkish students was 21.2 ± 2.2 years, while that of the Bosnian students was 24.2 ± 5.2 years (p<0.05). Among the students in Türkiye, 89.9% were female, 97.1% were single, 49.3% of their mothers, and 36.2% of their fathers had graduated from primary or secondary school. In Bosnia and Herzegovina, 89.2% of the students were female, 86.7% were single, and 47.0% of their mothers and 56.6% of their fathers were high school graduates. A total of 71.0% of the students in Türkiye and 79.5% of the students in Bosnia and Herzegovina did not have any disease.

Table 2. Dietary habits of participants by country

	Türkiye		Bosnia and Herzegovina	
	n	%	n	%
Number of main meals				
1 main meal	4	5.8	6	7.2
2 main meals	44	63.8	52	62.7
3 main meals	21	30.4	25	30.1
Number of snacks				
Not	5	7.2	17	20.5
1 snack	21	30.4	38	45.8
2 snacks	37	53.6	14	16.9
3 snacks	6	8.7	14	16.9
Regular consumption habits				
I do not skip meals	21	30.4	25	30.1
I often skip breakfast	21	30.4	22	26.5
I often skip lunch	29	42.0	7	8.4
I often skip dinner	1	1.4	27	32.5
I often skip snacks	17	24.6	30	36.1
Frequency of eating at home/outside the country				
Every day	3	4.3	9	10.8
5-6 times a week	2	2.9	5	6.0
3-4 times a week	17	24.6	18	21.7
<2 times per week	35	50.7	28	33.7
1-2 times a month	12	17.4	23	27.7
The most commonly used fat in the diet				
Butter	15	21.7	16	19.3
Vegetable oil	29	42.0	51	61.4
Olive Oil	25	36.2	16	19.3
Amount of water consumed				
Less than 2 liters	40	58.0	48	57.8
2 liters and more	29	42.0	35	42.2

Information on students' dietary habits by country is presented in Table 2. The majority of students skipped the main meal (69.6% and 69.9% in Türkiye and Bosnia and Herzegovina, respectively). The most frequently skipped meal was lunch in Türkiye (42.0%) and dinnerin Bosnia and Herzegovina (32.5%). Vegetable oil was the most frequently used fat in the diets of students in both countries (42.0% in Türkiye and 61.4% in Bosnia and Herzegovina).

Table 3. Anthropometric characteristics of participants by country

	Türkiye		Bosnia and Herzegovina		p
Body weight (Mean± SD)	61.2 ± 14.7		67.3 ± 13.4		***0.000***
Height (Mean± SD)	165.0 ± 8.1		171.7 ± 7.5		***0.000***
BMI (Mean± SD)	21.5 ± 4.3		22.8 ± 3.6		***0.002***
BMI group	**n**	**%**	**n**	**%**	
Underweight	17	24.6	6	7.2	
Normal	40	58.0	58	69.9	***0.011***
Overweight	8	11.6	15	18.1	
Obese	4	5.8	4	4.8	
Mann–Whitney U. Crosstab-Chi-square					

The anthropometric characteristics of the participants are presented in Table 3. The mean body weight, height, and body mass index (BMI) of students in Bosnia and Herzegovina were significantly greater than those of students in Türkiye (p<0.05). The majority of students in both countries (58.0% vs 69.9% in Bosnia and Herzegovina and Türkiye, respectively) fell within the normal BMI range.

Table 4 shows the physical activity, diet quality, and mental well-being characteristics of participants by country. Students in Bosnia and Herzegovina had a mean physical activity score of 3.6, with 43.4% classified as sufficiently active, which was significantly higher than the proportion reported in Türkiye (p<0.05). Mental well-being was also assessed, and the scores of the students from the two countries were similar (51.2 ± 8.8 vs 51.7 ± 9.3 in Bosnia and Herzegovina and Türkiye, respectively) (p>0.05).

Table 4. Participants' physical activity. diet quality and mental well-being characteristics by country

	Türkiye		Bosnia and Herzegovina		
	n	%	n	%	p
Physical activity group					
Sufficiently active	16	23.2	36	43.4	***0.009***
Insufficiently active	53	76.8	47	56.6	
Physical activity score (Mean± SD)	2.3 ± 2.3		3.6 ± 2.4		***0.001***
MEDAS group					
Low	30	43.5	31	37.3	
Moderate	25	36.2	25	30.1	0.238
High	14	20.3	27	32.5	
MEDAS score (Mean± SD)	6.6 ± 2.2		7.7 ± 2.5		***0.034***
Mental well-being score (Mean± SD)	51.7 ± 9.3		51.2 ± 8.8		0.736
Mann–Whitney U					

The relationships between anthropometric measurements and variables such as age, physical activity, MEDAS score, and mental well-being score were also analyzed. In Bosnia and Herzegovina, a significant positive correlation was found only between age and MEDAS score (r=0.231, p=0.036).In Türkiye, a negative correlation was found between average BMI and MEDAS score (r=-0.306, p=0.011), and a significant positive correlation was found between mental well-being and MEDAS score (r=0.359, p=0.002) (data not shown in the Table).

4. Discussion

Dietary habits are among the oldest and most deeply rooted aspects of many cultures and cannot be easily changed. Since each country has its own culture, nutrition and dietary habits vary accordingly. This study was conducted to evaluate the dietary habits, nutritional status, physical activity status, and mental well-being of university students in two different countries and to compare these factors.

Smoking and tobacco use are major risk factors for morbidity and mortality worldwide. A study by the United States Department of Health and Human Services revealed that nearly nine out of ten smokers started smoking before adulthood (29). In a study conducted in Riyadh, 76.4% of 895 university students reported never using tobacco (30); in another study, this rate was 93.1% (31). In a study conducted in Türkiye, 23.7% of university students who participated in the study reported smoking (32). Similarly, a study conducted in Bosnia and Herzegovina found that 34.1% of university students smoked (33). In our study, the majority of students from both countries were nonsmokers, while the percentage of smokers was similar.

Alcohol consumption among young people is also a major health problem. According to the World Health Organization (WHO), 25% of youth deaths are attributed to alcohol (34). In the past, alcohol use was most prevalent among middle-aged adults, with lower consumption rates among young adults. Today, however, excessive alcohol consumption among young people worldwide is estimated to have doubled compared to that of their parents at the same age (35). A study conducted in Italy revealed that the age group most prone to excessive alcohol consumption was young people aged 18–24 years (36). Although reported rates of alcohol consumption among university students vary widely in the literature from 27.46% to 75.7%, our study found rates of 30.1% in Bosnia and Herzegovina and 26.1% in Türkiye (37–40). The reason for such different results in the literature may be attributed to cultural differences, including dietary habits, family influence, and religious beliefs.

University is a period during which dietary habits change. In one study, 75.0% of university students consumed three or more meals per day, and 59.7% ate out of thehome three or more days per week (41). In another study, 33.3% of university students skipped meals, 39.6% ate meals outside the home three or more days per week, and 42.2% had a daily water consumption of less than 2 liters (42). In our study, the proportion of students in both countries (Bosnia and Herzegovina and Türkiye; 69.6% vs 69.9%, respectively) who did not consume three main meals per day was greater than that reported in the literature, whereas the proportion of students who ate at home or outside three or more days a week in both countries was similar to that reported in the literature. The reason for the similar rates between countries may be attributed to their dietary cultures and habits of the two cultures do not differ substantially from each other. One of the important differences between the two countries was the type of oil used in cooking. Turkish students use olive oil approximately two times more frequently than Bosnian students do. This may be because vegetable dishes prepared with olive oil are commonly included in the food culture of Türkiye. In Bosnia and Herzegovina's culinary culture, the fact that most of the dishes are meat-based may explain the lower use of olive oil.

Weight gain in young adults is likely to occur during the transition to university life, a critical period when behaviors, including their dietary habits, are particularly susceptible to change as they gain independence in their food choices (43). In various studies involving university students, the rates of overweight and obese students were found to be 12.0%-26.4%-27.8%-28.8% (11,42,44,45). In our study, a significantly greater percentage of Bosnian students were within the normal BMI range compared to Turkish students, whereas the total percentage of overweight and obese Turkish students was lower than that of Bosnian students. This difference may be related to variations in cultural dietary habits, lifestyle behaviors, or socioeconomic factors between the student populations in the two countries. Further research with a more homogeneous sample profile may help clarify the underlying reasons.

Adherence to a healthy diet, such as the Mediterranean diet, may have beneficial effects on university students by improving their academic performance and quality of life, as well as their mental and physical health (46). In contrast to the Mediterranean diet, the Western-style diet is characterized by excessive consumption of refined grains, red and processed meats, processed and ultra-processed foods, ready meals, snacks, sugar-sweetened beverages, and insufficient consumption of fruits and vegetables (47). Studies have shown that starting university leads to greater independence and autonomy in food choices but also increases the risk of adopting unhealthy eating habits (48,49). In a study conducted with university students in the United States, 34.0% of the students reported low adherence to the Mediterranean diet, 47.0% reported moderate adherence, and 20.0% reported high adherence (50). In a study conducted in Türkiye, the rate of low adherence was 47.3% (8). In another study, half of the students reported low adherence to the Mediterranean diet, and MEDAS scores decreased as BMI increased (51). In a systematic review of studies conducted in Mediterranean countries, the majority of the studies included in the review reported low or moderate adherence to the Mediterranean diet (52). In our study, Bosnian students had higher MEDAS scores and a higher rate of adherence to the Mediterranean diet than Turkish students. Both Türkiye and Bosnia and Herzegovina are considered Mediterranean countries. According to an article by Noah and Truswell, Mediterranean countries were divided into four groups, namely, Western, Adriatic, Eastern, and North African, based on neighboring countries whose dietary habits are more similar to each other than to those of other countries. Bosnia and Herzegovina is in the Adriatic group, whereas Türkiye is in the Eastern group (53). Some of the dietary habits in these regions are similar, whereas others are different.

Physical inactivity and sedentary lifestyles are major public health problems, especially among young adults such as university students, who often struggle to balance academic, work, and personal responsibilities. In a study conducted at King Saud University, 45.4% of university students were found to be physically inactive, whereas in another study, this percentage was 41.4% (54,55). The World Health Organization's 2022 report for Bosnia and Herzegovina revealed that 23.0% of men and 28.0% of women over the age of 18 were physically inactive (56). In a study conducted in Türkiye, 28.0% of the university students who participated in the study were found to be physically inactive (57). In our study, unlike the existing literature, the rate of physically inactive people was higher, and Bosnian students were significantly more active than Turkish students. The reason why the rates in our study differ from those in the literature may be attributed to the different measurement scales used. Since Istanbul, one of the study locations, is a large metropolis with a greater area than Sarajevo and has a wide transportation network, pedestrian transportation may not be preferred as much as in Sarajevo. The fact that many central places in Sarajevo can be reached on foot may have given Bosnian students an advantage over Turkish students in terms of physical activity.

The mental health of university students is highly important. The Healthy Minds Study, a large-scale study, revealed that 60.0% of university students met the criteria for at least one mental health disorder (58). Additionally, a 2023 report published by the American College Health Association revealed that approximately 76.0% of students experienced moderate to severe psychological distress (59). A study conducted by Hirendra Rai et al. (2019) reported that 82.0% of university students had mental wellbeing scores ranging from 43 to 60 points (60). The mental wellbeing scores of Bosnian and Turkish students in this study were similar.

4.1. Limitation

This study has several limitations. The first limitation is the relatively small sample size, which limits the generalizability of the findings. Therefore, the results should be interpreted as preliminary, providing a foundation for future studies with larger and more representative samples. Due to the self-reported nature of anthropometric data (such as body weight and height), potential measurement bias may have occurred. Furthermore, due to the online nature of data collection, obtaining detailed and reliable dietary intake records (e.g., quantitative assessment of macronutrient and micronutrient) was not feasible. Another limitation is the lack of country-specific validation studies for some of the instruments used, particularly in Bosnia and Herzegovina. Although the MEDAS and WEMWBS have been validated in Turkish and several other European populations, and

the Brief Physical Activity Assessment Tool has been widely used internationally, none of these instruments have been specifically validated in Bosnia and Herzegovina.

Despite these limitations, this study has several notable strengths. The use of standardized, valid, and reliable tools, such as the Mediterranean Diet Adherence Screener, the Brief Physical Activity Questionnaire, and the Warwick-Edinburgh Mental Well-Being Scale, ensures a consistent methodology. In addition, the fact that our study is the first comprehensive comparison of nutritional status, dietary habits, diet quality, physical activity status, and mental wellbeing of Turkish and Bosnian university students increases the originality of our study.

5. Conclusion and Recommendations

Our study revealed that Bosnian students had a higher mean BMI, although the majority of students from both countries had normal body weights. However, Bosnian students were more active in terms of physical activity and showed greater adherence to the Mediterranean Diet than Turkish students. Although both cultures have similarities and differences, the need for health promotion for students from both countries is a shared concern. Since university represents a critical transition to adult life, fostering and supporting healthy behaviors during this period is highly important. Therefore, universities should adopt and implement nutrition and health education programs to reduce the prevalence of overweight and obesity, improve students' dietary habits, and increase their physical activity levels.

6. Contribution to the Field

This study makes significant contributions to the literature by comparing the nutritional habits, diet quality, physical activity levels, and mental well-being of university students in Bosnia-Herzegovina and Türkiye. By providing a cross-cultural perspective and evaluating the effects of adherence to the Mediterranean diet on mental health and diet quality, the study reveals unhealthy habits and risk factors among young adults. In addition, by examining the relationship between physical activity and psychological well-being, it emphasizes the need to develop early intervention programs. Utilizing reliable scales and methods, this study provides a solid foundation and scientific evidence on the effects of cultural and geographical differences on health and quality of life.

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Conflict of Interest

There is no conflict of interest with any person and/or institution.

Authorship Contribution

Concept: MP, JĐ; Design: MP, JĐ Supervision: JĐ; Funding: None; Materials: None; Data Collection/Processing: MP, JĐ; Analysis/Interpretation: MP; Literature Review: MP; Manuscript Writing: MP, JĐ; Critical Review: JĐ.

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