Evaluation of Healthy Nutrition Scores with Different Diet Quality Indices in Faculty of Sports Science Students

Spor Bilimleri Fakültesi Öğrencilerinin Sağlıklı Beslenme Skorlarının Farklı Diyet Kalite İndeksleri ile Değerlendirilmesi

Nilgün SEREMET KÜRKLÜ[a], Hülya KAMARLI ALTUN[a]

[a]Department of Nutrition and Dietetic, Akdeniz University Faculty of Health Science, Antalya, TURKEY

ABSTRACT Objective: This study was conducted to determine the diet quality of the students from the faculty of sport sciences and to correlate healthy nutrition scores with anthropometric measurements. **Material and Methods:** The study was carried out on 276 students. They were asked to fill out a survey and a Mediterranean Diet Quality Index (KIDMED) questionnaire to define their sociodemographic characteristics and their food consumption was recorded through a 24-hour dietary recall method. Healthy Eating Index (HEI), Diet Inflammatory Index (DII), and Dietary Approaches to Stop Hypertension (DASH) diet scores were calculated. Also, some anthropometric measurements (body weight, height, waist circumference etc.) were taken, and their body compositions were evaluated by bioimpedance analysis. The data were evaluated in SPSS 22.0 program and the significance level was accepted as $p<0.05$. **Results:** Based on the body mass index, 73.8% of the males and 72.4% of the females were defined as normal weight. Considering the KIDMED and HEI scores, it was found that the majority of students had a moderate or poor diet quality and that a significant relationship was only present between the KIDMED score and the upper-middle arm circumference ($r=-0.142$, $p<0.01$) and lean body mass ($r=0.160$, $p<0.01$). **Conclusion:** As a result, although it was determined that most of the students participating in the study diet quality was low, no relationship was found between healthy nutrition scores and anthropometric measurements other than upper middle arm circumference and lean body mass. Studies with larger sample numbers are needed to determine this relationship.

Keywords: Mediterranean diet quality index;
dietary inflammatory index; healthy eating index;
faculty of sports science students

ÖZET Amaç: Bu çalışma, spor bilimleri fakültesi öğrencilerinin diyet kalitesi ve sağlıklı beslenme skorları ile antropometrik ölçümler arasındaki ilişkiyi belirlemek amacıyla yapılmıştır. **Gereç ve Yöntemler:** Çalışma 276 öğrenci ile gerçekleştirilmiştir. Öğrencilerin sosyodemografik özelliklerini tanımlamak için soru formu ile Akdeniz Diyet Kalite İndeksi (KIDMED) anketi doldurmaları istenmiş olup, besin tüketimleri 24 saatlik diyet hatırlama yöntemiyle kaydedilmiştir. Sağlıklı Beslenme İndeksi (SBİ), Diyet İnflamatuar İndeksi (Dİİ) ve Hipertansiyonu Durdurmak İçin Diyet Yaklaşımları [Dietary Approaches to Stop Hypertension (DASH)] diyet puanları hesaplanmıştır. Ayrıca bireylerin bazı antropometrik ölçümleri (vücut ağırlığı, boy, bel çevresi vb.) alınmış ve vücut kompozisyonları biyoimpedans analizi ile değerlendirilmiştir. Veriler, SPSS 22.0 programında değerlendirilmiş olup, anlamlılık düzeyi $p<0,05$ olarak kabul edilmiştir. **Bulgular:** Beden kitle indeksine göre erkeklerin %73,8'i, kızların ise %72,4'ü normaldir. KIDMED ve SBİ puanlarına bakıldığında, öğrencilerin çoğunluğunun orta veya kötü beslenme kalitesine sahip olduğu ve sadece KIDMED puanı ile üst-orta kol çevresi ($r=-0,142$, $p<0,01$) ve yağsız vücut kütlesi ($r=0,160$, $p<0,01$) arasında anlamlı bir ilişki olduğu görülmüştür. **Sonuç:** Sonuç olarak, çalışmaya katılan öğrencilerin çoğunluğunun diyet kalitelerinin düşük olduğu belirlenmesine rağmen üst orta kol çevresi ve yağsız vücut kütlesi dışında diğer antropometrik ölçümler ile sağlıklı beslenme skorları arasında ilişki bulunamamıştır. Bu ilişkinin saptanabilmesi için daha büyük örneklem sayısı olan çalışmalara ihtiyaç duyulmaktadır.

Anahtar Kelimeler: Akdeniz diyet kalite indeksi;
diyet inflamatuar indeksi; sağlıklı yeme indeksi;
spor bilimleri fakültesi öğrencileri

Nutrition can be defined as taking the nutrients which needs the body in sufficient quantities and at appropriate times to protect, improve, and increase the quality of life. Today, unhealthy dietary habits emerging as a result of the combination of various factors have been threatening the health of individuals and, consequently, societies. Adequate and balanced nutrition is the basic element for optimal health in every period of life.[1]

It has special importance in acquiring healthy dietary habits and developing a healthy lifestyle to meet the necessary energy and nutrients in childhood and youth. Wrong dietary habits in these periods are the source of chronic diseases that occur later in life.[2]

University students are one of the risky groups in terms of nutritional problems. University life is the beginning of a new era in nutrition, as in many other areas in the life of young people. In this period, the fast-paced life of young people, newly established circle of friends, economic difficulties, and housing conditions bring unhealthy and irregular eating behaviors.[3]

Diet quality indices have been developed considering that the diet has a complex structure, therefore it will be more accurate to evaluate the interaction of the nutrients or nutritional elements taken, i.e. dietary pattern, instead of evaluating them singly. When the dietary pattern is evaluated by diet indices or scores, the effects of nutrients, nutritional elements, and other dietary components on potential health problems can be better understood. Diet quality indices are obtained by defining many nutrients or food groups and calculating the consumption amounts of the nutritional elements.[4] The indices used to measure the quality of diet commonly applied by adults are the Healthy Eating Index (HEI), the Mediterranean Diet Quality Index (KIDMED), Dietary Approaches to Stop Hypertension (DASH), and the Dietary Inflammatory Index (DII) which has been developed in recent years.[5]

HEI is an index that assesses the quality of the diet and evaluates how well individuals comply with the nutritional recommendations in the nutrition guide and the food pyramid, and how well they meet their dietary patterns.[6] In a study, the nutritional status of young adults between the ages of 19-35 was evaluated with HEI-2005, and it was stated that the nutritional status of the majority of individuals (72.6% male, 85.8% female) should be improved and the quality of their diet was poor.[7] The Mediterranean diet, which has a high consumption of fruits, vegetables, and whole grains and limited consumption of foods with high sugar and saturated fat content, and which constitutes an example of adequate and balanced nutrition, has many protective effects on health.[8,9] In the studies evaluating university students' diet quality with HEI and KIDMED, it was stated that the diet quality of the majority of students should be improved.[7,10,11] The DASH diet score mainly recommends the consumption of vegetables and fruits and low-fat milk and dairy products, while limiting the intake of saturated fat, total fat, and cholesterol.[1] After determining that the DASH diet plan reduces the risk of many chronic diseases, another DASH diet score, which indicates the individual's healthy nutrition status, has been developed.[12-14] Another diet quality index developed in recent years is the DII which show the inflammatory potential of the diet. Studies have shown that increasing compliance with the DASH diet or decreasing the inflammatory potential of the diet is associated with lower body weight, body mass index (BMI), and waist circumference.[15-18]

As far as we know, since there is no study in which healthy nutrition scores of sports faculty students were evaluated by different dietary qua-lity indices and compared with anthropometric measurements, this study was planned to eliminate this deficiency in the literature.

MATERIAL AND METHODS

POPULATION AND SAMPLE OF THE STUDY

The population of this descriptive study consisted of 956 students who continue their education at Akdeniz University Faculty of Sport Sciences. The sample of the study included 276 students who agreed to participate in the study and who were determined by the calculation of sample size with a known population. Students who continued their education at Akdeniz University Faculty of Sport Sciences, who were 18 or above and who agreed to participate in the study were included in the study; whereas, those who did not agree to participate in the study, who completed the questionnaire but did not undergo body analysis, and who were under the age of 18 were excluded from the study. This study was conducted according to the guidelines laid down in the Declaration of Helsinki, and informed consent was obtained from all participants before starting the study. All procedures involving research study participants were approved by the Akdeniz University Faculty of Medicine Clin-

ical Research Ethics Committee (on 07.05.2018 and with the decision number of 317).

COLLECTION AND EVALUATION OF STUDY DATA

In this study, the students' descriptive information was obtained, and their food consumption levels were recorded by the investigator through a 24-hour retrospective reminder method after they had completed the questionnaire containing 16 questions about the "KIDMED". In addition to these, some anthropometric measurements of the individuals (height, body weight, waist, and upper-middle arm circumference measurements) were taken, and their body compositions were determined using a body analyzer (Tanita, BC418).

CALCULATION OF DIET QUALITY INDICES

To determine the nutritional status of each individual participating in the study, a one-day retrospective "individual food consumption" was defined. The food amounts in grams specified in the records and taken as a measure were calculated by using the book "Food and Nutrition Photo Catalog: dimensions and quantities". After determining the amount of food consumed for each day, daily energy, macro and micronutrients of the students were determined by using the Nutrition Information Systems Package Software version 8.0 (BEBIS). HEI, DASH diet score, and DII score were calculated based on the food consumption record data obtained from the individuals.

Mediterranean Diet Quality Index: KIDMED, which evaluates compliance with the Mediterranean diet, is an index consisting of a total of 16 questions focusing on the characteristics of the Mediterranean diet. Of the questions included in this index, 12 are positive questions and 4 are negative questions. Those who answer yes to positive questions get (+1) point, and those who answer yes to negative questions get (-1) point. When these points are summed up at the end of the evaluation, scores ranging from 0-12 are obtained. Afterward, these scores are divided into 3 groups as ≥8 points referring to an optimal Mediterranean diet (good), 4-7 points indicating the need to improve compliance with the Mediterranean diet (moderate/improvable), and ≤3 points showing a very low nutrition quality (poor).[19]

Healthy Eating Index: HEI-2010 consists of 12 dietary components. Of these components, the first 9 determine the adequacy of the diet and the last 3 determine those which need to be consumed in limited amounts. Each component of adequacy has its standard. With the increase in consumption, the points increase proportionally. In the limited consumption components, low consumption increases the score. The total score of HEI-2010 is given based on 100 points by summing up the components of adequacy and those of limited consumption. Component scores are in the range of 0-5, 0-10, or 0-20, and the score corresponding to 100% in total means that the recommended amounts are met or exceeded. When the diet quality of the individuals is categorized based on the total HEI score, points which are 50 or below are defined as "poor diet quality", those between 51 and 80 as "improvable diet quality" and those above 80 as "good diet quality".[6]

Dietary Approaches to Stop Hypertension Diet Score: The DASH diet score is obtained by scoring (0-5 points) quintiles of the 5 dietary components required to be consumed in the DASH diet, which is calculated from the food consumption amounts of individuals, and the 3 dietary components negatively related to the DASH diet. DASH diet score can vary between 8-40 points in total.[18]

Dietary Inflammatory Index: DII, which is achieved as a result of the evaluation of studies defining the contribution of some nutrients or nutritional elements to inflammation, is obtained by multiplying 45 nutrients/nutritional elements from individuals' food consumption records with the inflammation scores determined by Shivappa et al. Although there is no classification for DII, it is stated that the diet of the individual shows a proinflammatory effect as the DII increases and an anti-inflammatory effect as it decreases.[20]

STATISTICAL ANALYSIS OF DATA

The data obtained from the study were evaluated in the IBM SPSS version 22.0 (IBM Corp., Armonk, NY, USA). Average, standard deviation, median, minimum and maximum values were calculated in the evaluation of quantitative data. After the calculation of diet quality indices, a student t-test was used

to compare the data by groups. Pearson correlation test was used to compare categorical data and to determine the relationship between the results of dietary quality indices and anthropometric measurements. In statistical analyses, the significance level was accepted as p<0.05.

■ RESULTS

It was determined that 54.0% of the students participating in the study were male and 46.0% were female. According to students' field of study it was found that 30.8% of the students studied physical education and sports, 26.1% coaching education, 26.1% recreation, and 17.0% sports management. In terms of housing, 42.8% of the students stayed together with their families and 31.5% of them stayed in a student house (Data not shown).

Anthropometric measurements of male and female students are shown in Table 1. While the average BMI of the males is 23.2±2.89 kg/m², that of the females is 20.9±2.93 kg/m². Average waist circumference of male and female students is 82.8±8.55 cm and 71.9±7.79 cm, average of waist/height ratio is 0.5±0.04 and 0.4±0.04, body fat (%) average is 13.3±6.11 and 21.2±6.41, and lean body mass average is 64.2±8.02 kg and 45.9±5.59 kg, respectively. Based on the BMI and classification, 73.8% of the males and 72.4% of the females were defined as normal weight. It was also found that underweight rate was higher in females (18.1%) than in males (2.0%), and the rate of being overweight was higher in males (22.8%) than in females (8.7%) (p<0.05) (Data not shown).

In Table 2, the average of the diet quality indices of the individuals is shown. It was determined that the mean of KIDMED index of male and female students was 5.0±2.83 and 4.7±2.75, the average of the HEI was 48.5±12.36 and 47.7±11.29, and the mean of the diet inflammatory index was 1.1±1.80 and 1.3±1.9, and DASH dietary index was 24.4±4.92 and 24.5±4.54, respectively. It was determined that there was no statistically significant difference between male and female students' four different diet quality index scores (p>0.05).

In Figure 1, the classification of KIDMED and HEI diet quality indices are given. While 42.3% of

TABLE 1: Anthropometric measurements of individuals.		
	Male (n=149)	**Female** (n=127)
Anthropometric measurements	**X̄±SD**	**X̄±SD**
Weight (kg)	73.9±11.36	58.5±10.32
Height (cm)	178.3±7.45	166.9±6.48
Body mass index (kg/m²)	23.2±2.89	20.9±2.93
Waist (cm)	82.8±8.55	71.9±7.79
Upper-middle arm circumference (cm)	30.1±3.36	25.7±2.87
Waist/height ratio	0.5±0.04	0.4±0.04
Body fat (%)	13.3±6.11	21.2±6.41
Lean body mass (%)	10.3±5.84	13.0±6.03
Lean body mass (kg)	64.2±8.02	45.9±5.59
Total body water (%)	61.5±4.69	55.8±5.71

SD: Standard deviation.

TABLE 2: Dietary quality indices scores of individuals.		
	Male (n=149) X̄±SD (minimum-maximum)	Female (n=127) X̄±SD (minimum-maximum)
Dietary quality indices		p value
KIDMED	5.0±2.83 (0.0-11.0)	4.7±2.75 (0.0-10.0)	0.480
HEI	48.5±12.36 (23.1-48.5)	47.7±11.29 (27.2-75.5)	0.586
DII	1.1±1.80 (-2.65-4.61)	1.3±1.90 (-3.38-5.16)	0.424
DASH	24.4±4.92 (13.0-38.0)	24.5±4.54 (8.0-37.0)	0.880

*p<0.05; SD: Standard deviation; KIDMED: Mediterranean Diet Quality Index; HEI: Healthy Eating Index; DII: Diet Inflammatory Index; DASH: Dietary Approaches to Stop Hypertension Diet Index.
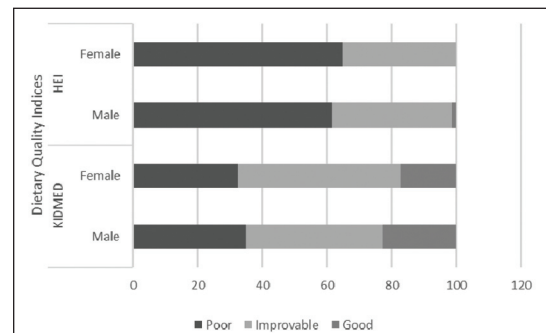

FIGURE 1: Classification of individuals' diet quality.
KIDMED: Mediterranean Diet Quality Index; HEI: Healthy Eating Index.

male students and 50.4% of female students complied with the Mediterranean diet on a medium level (im-

TABLE 3: Correlation between individuals' diet quality indices scores and anthropometric measurements.				
	KIDMED	HEI	DII	DASH
Anthropometric measurements		r value		
Weight (kg)	0.059	0.038	-0.030	0.009
Body mass index (kg/m²)	0.059	0.044	-0.031	-0.014
Waist circumference (cm)	0.011	0.024	-0.037	-0.003
Waist/height ratio	0.000	0.018	-0.038	-0.017
Upper-middle arm circumference (cm)	-0.142*	0.061	-0.070	0.056
Body fat mass (%)	-0.044	-0.054	0.070	-0.074
Lean body mass (%)	0.160*	0.081	-0.074	0.094

*p<0.05; KIDMED: Mediterranean Diet Quality Index; HEI; Healthy Eating Index; DII: Diet Inflammatory Index; DASH: Dietary Approaches to Stop Hypertension Diet Index.

TABLE 4: Correlation between dietary quality indices of individuals.				
	KIDMED	HEI	DII	DASH
KIDMED	1			
HEI	0.073	1		
DII	0.003	-0.423**	1	
DASH	0.184**	0.617**	-0.422**	1

**p<0.01; KIDMED: Mediterranean Diet Quality Index; HEI: Healthy Eating Index; DII: Diet Inflammatory Index; DASH: Dietary Approaches to Stop Hypertension Diet Index.

provable), one-third of both males (34.9%) and females (32.3%) complied with the Mediterranean diet on a poor level. When individuals were evaluated based on their HEI scores, 61.4% of male students and 64.8% of female students were found to have poor diet quality.

Table 3 indicates the correlation between diet quality indices and anthropometric measurements. It was determined that KIDMED score was negatively correlated with upper-middle arm circumference on a low level (r=-0.142, p<0.05), and positively correlated with lean body mass on a low level (r=0.160, p<0.05). No significant relationship was found between anthropometric measurements and other diet quality index scores (p>0.05).

The correlation between individuals' diet quality index scores is provided in Table 4. It was found that DII was negatively correlated to HEI and DASH diet score on a medium level (r=-0.423 and r=-0.422, respectively p<0.01), and that DASH diet score and

HEI were positively correlated (r=0.617, p<0.01) on a high level.

DISCUSSION

The last years of adolescence and the university years in which the first period of adulthood begins mark the periods when young people's dietary habits change. In this period, students who leave their families can start to eat outside, turn to fast-food-style foods, and have an inadequate and imbalanced diet.[21,22] Adequate and balanced nutrition is important as it affects the performance of those especially in sports sciences, as well as protecting the overall health of all university students.[23] With this study, Faculty of Sport Sciences students, their anthropometric measurements were taken and the diet quality of the students was evaluated using four different diet quality indices.

The students of the faculty of sport sciences need to be physically active more than other university students in the prevention of obesity.[24] In addition, the BMI within normal limits contributes to the development of respiratory, motor, and dynamic functions in athletes.[25] It was observed in this study that the number of students who were obese was low, and the BMIs of the majority of students were in the normal range. Similar results were obtained in studies evaluating the BMI values of the faculty of sport sciences students.[26,27] In a study evaluating body composition with body fat analysis in addition to BMI among students of the faculty of sports, it was observed that body fat ratios of 40.0% of the male students and 41.7% of the female students were excellent (<11% and <19%, respectively), while those of 34.7% of the males and 28.3% of the females were very good (~15% and ~22%, respectively).[28] In our study, the body fat ratios of the students were measured by bioimpedance analysis, and it was found that the percentage of body fat in males was 13.3±6.11% and it was 21.2±6.41% in females.

As also seen in this study, since the university students who are young adults live far from their families, their dietary habits are changing, their nutritional varieties are decreasing, and therefore, the quality of their diet is negatively affected.[22] In a study

with university students (18-24 years of age) in five different European countries were evaluated for compliance with the Mediterranean diet based on KIDMED score, it was determined that 31.7% of the students had a KIDMED score of eight and above.[29] Another study reported that 62.1% of university students (n=570) complied with the Mediterranean diet on a medium level, and 28.4% of them at a good level. It was also reported that overweight students had lower KIDMED scores.[11] The KIDMED scores of university students studying physical education in Spain and Romania were found to be 6.65±2.63 and 5.06±1.31 points, respectively.[30] In this study, the average of KIDMED index of male and female students was calculated as 5.0±2.83 and 4.7±2.75 points, respectively, and it was observed that approximately half of the students complied with the Mediterranean diet on a medium level while 33.7% on a poor level. It is an expected result that the compliance of the university students to the Mediterranean diet is low, since they live far away from their families, they often eat outside and they prefer fast food. In the studies conducted, it was determined that the consumption of vegetables, fruits, and legumes, which are among the most important components of the Mediterranean diet, was low, and the consumption of meat, especially fast foods, was frequent.[21,22] For this reason, the students' compliance with the Mediterranean diet is thought to be poor. In our study, it was also determined that KIDMED score was negatively correlated with the upper-middle arm circumference (r=-0.142, p<0.05), and positively correlated with the body muscle mass (r=0.160, p<0.05). With increasing consumption of Mediterranean diet components, it is expected that the upper-middle arm circumference, which is an indicator of obesity, will decrease and muscle mass will increase. In support of our study, one study found that there was a weak, negative correlation between the KIDMED index and upper-middle arm circumference measurements in children and adolescents (r=-0.181, p<0.05).[8]

HEI is an index developed to evaluate the diet quality of individuals. In this study, the average of HEI scores of male and female students was 48.5±12.36 and 47.7±11.29, respectively. According to the HEI score, 63.1% of the students had a poor diet quality. Similarly, in a study conducted in our country by Çil et al. to evaluate the diet quality of university students with HEI, it was determined that the majority of the students had poor diet quality and there was no relationship between the HEI scores and anthropometric measurements. In addition, although similar studies are examining the relationship between HEI and anthropometric measurements, none has found a relationship.[31-33] Although there are studies in the literature where university students' diet quality is evaluated with a healthy eating index, no studies on this subject have been conducted on students of the faculty of sports sciences. Considering the importance of nutrition in athletes, it was concluded that diet quality should be improved.

The DII is an index that indicates the potential of the diet to cause inflammation.[16] Up to now, studies on the DII have generally been conducted on the middle age group and the elderly. In a study conducted to determine the diet quality of university students in the USA, three-day food consumption records of the students were obtained and their HEI and DII scores were calculated. While the average HEI-2010 score of the students with a DII score of <2.8 points was 50.7, that of the students with a DII score of >4.6 points was 35.4.[34] In a similar study conducted on young adults, it was observed that the HEI and and DASH diet scores decreased as the DII score increased. It was seen that there was an inverse relationship between the DII scores and the Mediterranean diet index, DASH diet score, and healthy eating index. The reason for this is that, unlike DII, in other indices, inflammation levels decreasing due to healthy dietary habits (high consumption of whole grains, legumes, and fruits/vegetables) increase as a result of Western diet (proinflammatory).[5] In a healthy diet, while the DII scores decrease (anti-inflammatory diet), the HEI and DASH diet scores increase. Similar results were obtained in our study, and a negative moderate correlation (r=-0.423 and r=-0.422, p<0.01, respectively) was found between the DII and HEI and DASH diet score.

Our study has certain limitations. First of all, HEI, DII, and DASH diet quality indices were calcu-

lated based on the food consumption records questioned by 24-hour reminder method. Although food consumption records are questioned in detail by expert dietitian researchers, the fact that the records are 24-hour may be insufficient to evaluate the diet quality of the individuals. In addition, increasing the number of samples is thought to affect the study results, especially the relationship between diet quality and anthropometric measurement results. As far as we know, no study determines the diet quality of the students from the faculty of sport sciences by different diet quality indices. This is the biggest strength of our study.

CONCLUSION

In this study, which involved students of Akdeniz University Faculty of Sport Sciences, according to diet quality index scores, the number of individuals with low diet quality was high and only KIDMED score was correlated with upper-middle arm circumference and lean body mass on a low level. No significant relationship was found between anthro-

pometric measurements and other diet quality index scores. Studies with larger sample numbers are needed to determine this relationship. It was concluded that athletes should pay attention to adequate and balanced nutrition and improve their diet quality in order not to affect their performance. For this reason, we think that students should be educated about nutrition.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

REFERENCES

1. Larson N, Stang JS, Leak T. Nutrition in Adolescence. In: Mahan LK, Escott-Stump S, eds. Krause's food, nutrition, & diet therapy. 1st ed. Philadelphia: Elsevier; 2014. p. 331-49.

2. Ryoo E. Adolescent nutrition: what do pediatricians do? Korean J Pediatr. 2011;54(7):287-91. [Crossref] [Pubmed] [PMC]

3. Ermiş E, Doğan E, Erilli N, Satıcı A. Üniversite öğrencilerinin beslenme alışkanlıklarının incelenmesi: Ondokuz Mayıs Üniversitesi örneği. [An examination of nutritional habits of university students: the model of Ondokuz Mayıs University]. OMÜ SPD. 2015;6(1):30-40. [Crossref]

4. Hu FB. Dietary pattern analysis: a new direction in nutritional epidemiology. Curr Opin Lipidol. 2002;13(1):3-9. [Crossref] [Pubmed]

5. Wirth MD, Hébert JR, Shivappa N, Hand GA, Hurley TG, Drenowatz C, et al. Anti-inflammatory Dietary Inflammatory Index scores are associated with healthier scores on other dietary indices. Nutr Res. 2016;36(3):214-9. [Crossref] [Pubmed] [PMC]

6. Guenther PM, Reedy J, Krebs-Smith SM. Development of the Healthy Eating Index-2005. J

Am Diet Assoc. 2008;108(11):1896-901. [Crossref] [Pubmed]

7. Erçim RE, Pekcan G. Genç yetişkinlerin beslenme durumunun sağlikli yeme indeksi-2005 ile değerlendirilmesi. [Assessment of nutritional status of young adults with healthy eating index-2005]. Beslenme Diyet Dergisi. 2014;42(2):91-8. [Link]

8. Kabaran S, Gezer C. Kuzey Kıbrıs Türk Cumhuriyeti'ndeki çocuk ve adolesanlarda akdeniz diyetine uyum ile obezitenin belirlenmesi [Determination of the mediterranean diet and the obesity status of children and adolescents in Turkish Republic of Northern Cyprus]. Turk J Pediatr Dis. 2013;7(1):11-20. [Crossref]

9. Tosti V, Bertozzi B, Fontana L. Health Benefits of the Mediterranean Diet: Metabolic and Molecular Mechanisms. J Gerontol A Biol Sci Med Sci. 2018;73(3):318-26. [Crossref] [Pubmed] [PMC]

10. Durá Travé T, Castroviejo Gandarias A. Adherencia a la dieta Mediterránea en la población universitaria [Adherence to a Mediterranean diet in a college population]. Nutr Hosp. 2011;26(3):602-8. [Pubmed]

11. Rodríguez F, Palma X, Romo A, Escobar D, Aragú B, Espinoza L, et al. Hábitos alimentarios, actividad física y nivel socioeconómico en estudiantes universitarios de Chile [Eating habits, physical activity and socioeconomic level in university students of Chile]. Nutr Hosp. 2013;28(2):447-55. [Pubmed]

12. Asemi Z, Esmaillzadeh A. DASH diet, insulin resistance, and serum hs-CRP in polycystic ovary syndrome: a randomized controlled clinical trial. Horm Metab Res. 2015;47(3):232-8. [Crossref] [Pubmed]

13. Paula Bricarello L, Poltronieri F, Fernandes R, Retondario A, de Moraes Trindade EBS, de Vasconcelos FAG. Effects of the dietary approach to stop hypertension (dash) diet on blood pressure, overweight and obesity in adolescents: a systematic review. Clin Nutr ESPEN. 2018;28:1-11. [Crossref] [Pubmed]

14. Siervo M, Lara J, Chowdhury S, Ashor A, Oggioni C, Mathers JC. Effects of the dietary approach to stop hypertension (DASH) diet on cardiovascular risk factors: a systematic review and meta-analysis. Br J Nutr. 2015;113(1):1-15. [Crossref] [Pubmed]

15. Garcia-Arellano A, Ramallal R, Ruiz-Canela M, Salas-Salvadó J, Corella D, Shivappa N, et al; Predimed Investigators. Dietary inflammatory index and incidence of cardiovascular disease in the PREDIMED study. Nutrients. 2015;7(6):4124-38. [Crossref] [Pubmed] [PMC]

16. Saneei P, Fallahi E, Barak F, Ghasemifard N, Keshteli AH, Yazdannik AR, et al. Adherence to the DASH diet and prevalence of the metabolic syndrome among Iranian women. Eur J Nutr. 2015;54(3):421-8. [Crossref] [Pubmed]

17. Shivappa N, Hebert JR, Rashidkhani B. Association between inflammatory potential of diet and stress levels in adolescent women in Iran. Arch Iran Med. 2017;20(2):108-12. [Link]

18. Seremet Kurklu N, Karatas Torun N, Ozen Kucukcetin I, Akyol A. Is there a relationship between the dietary inflammatory index and metabolic syndrome among adolescents? J Pediatr Endocr Met. 2020;33(4);495-502. [Crossref] [Pubmed]

19. Serra-Majem L, Ribas L, Ngo J, Ortega RM, García A, Pérez-Rodrigo C, et alFood, youth and the Mediterranean diet in Spain. Development of KIDMED, Mediterranean Diet Quality Index in children and adolescents. Public Health Nutr. 2004;7(7):931-5. [Crossref] [Pubmed]

20. Shivappa N, Steck SE, Hurley TG, Hussey JR, Hébert JR. Designing and developing a literature-derived, population-based dietary inflammatory index. Public Health Nutr. 2014;17(8): 1689-96. [Crossref] [Pubmed] [PMC]

21. Arslan SA, Daşkapan A, Çakır B. [Specification of nutritional and physical activity habits of university students]. TAF Prev Med Bull. 2016;15(3):171-80. [Crossref]

22. Papadaki A, Hondros G, A Scott J, Kapsokefalou M. Eating habits of university students living at, or away from home in Greece. Appetite. 2007;49(1):169-76. [Crossref] [Pubmed]

23. Ozdoğan Y, Ozcelik AO. Evaluation of the nutrition knowledge of sports department students of universities. J Int Soc Sports Nutr. 2011;8:11. [Crossref] [Pubmed] [PMC]

24. Pavlović R, Simeonov A, Radić Z, Raković A, Idrizović K. Trend of the change of the anthropoemtric characteristics of students of physical education and sport in the period from 2008 to 2012. Research in Physical Education, Sport and Health. 2014;3(2):83-91. [Link]

25. Wu X.-y, Fu X-c. [The research of the relationship between the body mass index and the physical health variables of the college students]. Journal of Beijing Sport University. 2006;8:028. [Link]

26. Budakov N, Bokan D, Rakić D, Bokan D. Body mass index and physical activity of students of University of Novi Sad. SEEHSJ. 2012;2(1):8-14. [Link]

27. Popović-Ilić T, Stanković V, Ilić I, Ilić SH. Difference in body mass index and dietary habits of students of Faculty of Sport and Physical Education. Acta Med Median. 2019;58(2):51-5. [Link]

28. Neculăeş M, Lucaci P. [Statistical study on bodyweight and body fat among students from the Physical Education and Sport Faculty in Iaşi]. Timişoara Physical Education and Rehabilitation Journal. 2016;9(16):35-9. [Crossref]

29. Pérez-Gallardo L, BayonaMarzo I, Benito de Miguel MJ. The KIDMED test and index in five groups of European students. Rev Espanola Nutr Comunitaria. 2007;13(3):124-9. [Link]

30. Chacón-Cuberos R, Badicu G, Zurita-Ortega F, Castro-Sánchez M. Mediterranean diet and motivation in sport: a comparative study between university students from Spain and Romania. Nutrients. 2018;11(1):30. [Crossref] [Pubmed] [PMC]

31. Çil MA, Caferoğlu Z, Bilgiç P. Üniversite öğrencilerinde diyet kalitesinin ve yeme davranışının antropometrik ölçümler ile ilişkisi. [The Association of diet quality and eating behaviour with anthropometric measurements in university students]. ACU. 2020;11(1):61-7.

32. Acar Tek N, Yildiran H, Akbulut G, Bilici S, Koksal E, Gezmen Karadag M, et al. Evaluation of dietary quality of adolescents using Healthy Eating Index. Nutr Res Pract. 2011;5(4):322-8. [Crossref] [Pubmed] [PMC]

33. Hurley KM, Oberlander SE, Merry BC, Wrobleski MM, Klassen AC, Black MM. The healthy eating index and youth healthy eating index are unique, nonredundant measures of diet quality among low-income, African American adolescents. J Nutr. 2009;139(2):359-64. [Crossref] [Pubmed] [PMC]

34. Kim Y, Chen J, Wirth MD, Shivappa N, Hebert JR. Lower dietary inflammatory index scores are associated with lower glycemic index scores among college students. Nutrients. 2018;10(2):182. [Crossref] [Pubmed] [PMC]