ARAŞTIRMA / RESEARCH

The Relationship of Adherence to the Mediterranean Diet, Dietary Inflammatory Index and Nutrient Intake in University Students: A Cross-Sectional Study

Üniversite Öğrencilerinde Akdeniz Diyetine Uyumun Diyet İnflamatuvar İndeksi ve Besin Alımı ile İlişkisi: Kesitsel Bir Çalışma

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Abstract

Objective: Investigating the relationships between dietary inflammatory index (DII), nutrient intake, and adherence to the Mediterranean diet (MD) of university students was aimed in the present study.

Material and Method: A questionnaire consisting of socio-demographic characteristics, the Mediterranean Diet Adherence Screener (MEDAS), the 24-hour food record, and the DII scoring was completed by undergraduate students in Uskudar University.

Results: A total of 750 students (52.3% male, mean age= 21.6±2.2 years, mean body mass index= 23.97±2.63 kg/m2) were included in the study. Half (50.7%) of the students had low adherence to the MD. A 19.4% decrease was detected in the MEDAS scores as the body mass index of the students increased. The MEDAS score was positively associated with macronutrient (carbohydrates) intake. It was determined that as the MEDAS score increased; Vitamin A, Vitamin E, Vitamin C, Vitamin B6, biotin, folate, potassium, magnesium, phosphorus, chlorine, and iodine intake increased, and the DII decreased by 6.8% ($p<0.001$).

Conclusion: The dietary inflammatory potential was found not affected by the MEDAS score since the relationship disappeared in the regression analysis. Adherence to the MD was related to the intake of macro- and micro-nutrients, however, no statistically significant association was found on dietary inflammatory potential.

Keywords: Mediterranean diet, dietary inflammatory index, nutrition.

Öz

Amaç: Bu çalışmada üniversite öğrencilerinin diyet inflamatuvar indeksi (DII), besin alımı ve Akdeniz diyetine (AD) uyumu arasındaki ilişkilerin incelenmesi amaçlandı.

Gereç ve Yöntem: Üsküdar Üniversitesinde lisans eğitimi alan öğrenciler sosyo-demografik özellikler, Akdeniz diyetine uyum ölçeği (MEDAS), 24-saatlik besin tüketim kaydı ve DII skorlamasını içeren bir anketi tamamladılar.

Bulgular: Çalışmaya toplamda 750 öğrenci (%52,3 erkek, ortalama yaş= 21,6±2,2 yıl, ortalama beden kütle indeksi= 23,97±2,63 kg/m^2) dahil edildi. Öğrencilerin yarısının (%50,7) AD uyumu düşüktü. Öğrencilerin beden kütle indeksi değerleri arttıkça Akdeniz diyetine uyum (MEDAS) puanlarında %19,4'lük azalma saptandı. MEDAS puanı makrobesin (karbonhidrat) alımı ile pozitif ilişkiliydi. MEDAS puanı arttıkça A vitamini, E vitamini, C vitamini, B6 vitamini, biyotin, folat, potasyum, magnezyum, fosfor, klor ve iyot alımının arttığı ve DII %6,8 oranında azaldığı saptandı ($p<0.001$).

Sonuç: Regresyon analizinde ilişkinin ortadan kalkması nedeniyle diyetin inflamatuvar potansiyelinin MEDAS skorundan etkilenmediği görülmüştür. AD'ye bağlılık makro ve mikro besinlerin alımıyla ilişkiliydi, ancak diyetin inflamatuar potansiyeli üzerinde istatistiksel olarak anlamlı bir ilişki bulunmadı.

Anahtar Kelimeler: Akdeniz diyeti, diyet inflamatuvar indeksi, beslenme.

1. Introduction

The Mediterranean diet (MD) is a healthy dietary model that recommends moderate consumption of wine, fish and dairy products and low consumption of meat/meat products along with plenty of olive oil, fruits, vegetables, unrefined cereals, legumes and nuts (1). Evidence from the literature suggests that the MD has beneficial effects on morbidity and mortality rates in various types of cancer, diabetes, obesity, as well as cardiovascular and neurodegenerative diseases (2, 3).

Anti- or pro-inflammatory effects of nutrition were shown in the inflammatory process (4, 5). On the other hand, Hébert et al. advocated that the studies on a single food or food group may not reflect the true role of the nutrion on the inflammation. In this context, the dietary inflammatory index (DII) was developed to assess the inflammatory potential of the diet (6). The DII is an index that examines the influence of dietary components on serum pro/anti-inflammatory markers based on studies on large human populations and methods of assessing nutritional status (7). The associations between DII and chronic non-communicable diseases were shown in several studies (8, 9).

The MD may have an affect on DII and inflammatory markers (10-14). Casas et al., reported a decrease in inflammatory biomarkers during three and five-year follow-up periods when they compared Mediterranean diet to the low-fat diet. In the PREDIMED pilot study, administration of the MD showed a decrease in pro-inflammatory CD40 expression and serum IL-6 levels within three months (10, 11). MD resulted in significant improvements in inflammatory biomarkers such as IL-6, adiponectin, and CRP (12, 13). A study by Mayr et al. showed that DII scores decreased as adherence to the Mediterranean diet increased (14). During the 18-year follow-up period of a study, high DII scores and low adherence to the MD were found to increase the risk of lung cancer in individuals aged 40-69 (15). In another study, risk of endometrial cancer was reported approximately 50% lower in women with high adherence to the MD, and the risk of endometrial cancer reduced as the DII score decreased (16).

Studies examining adherence to the MD and inflammation in healthy adults are scarce in the literature. Since the MD is still considered as one of the healthiest diets today, this study aimed to examine the relationships between DII, intake of macro and micronutrients and adherence to the MD in university students.

2. Material and Methods

This cross-sectional descriptive study was conducted in undergraduate students of Uskudar University. Data were collected in the fall semester of the 2021-2022 academic year. The sample of the study was based on a simple random sampling method. The sample size was determined as 400 university students with a 95% confidence interval (17). The relevant study permissions were obtained from the Non-Interventional Research Ethics Committee of the institution with the number 61351342/January 2022. The researchers administered a face-to-face questionnaire consisting of demographic information, Mediterranean Diet Adherence Screening (MEDAS) and 24-hour dietary recall questions. The informed consent form was signed by each participant, and the study was conducted with the voluntary participation of 750 university students in total.

2.1. Body Mass Index (BMI)

BMI is an index calculated by dividing body weight (kg) by the square of height (m^2), which is frequently used in the evaluation and classification of obesity in adults. According to WHO, BMI values; <18.5 kg/m^2, 18.5-24.99 kg/m^2, 25.0-29.9 kg/m^2, and ≥30 kg/m^2 are defined as underweight, normal weight, overweight, and obesity, respectively (18).

2.2. 24-hour Food Dietary Recall

Information on all foods and beverages consumed by the participants on the last 1 day, including portion sizes and meal-times, was recorded in detail on the "24-Hour Food Dietary Recall" form. The obtained data were analyzed using Nutrition Information Systems (BeBiS 8.2) to calculate recipes and diet plans. BeBiS is a database that provides detailed energy and nutrient content of foods and recipes.

2.3. Dietary Inflammatory Index (DII)

DII is a literature-based index created by Schvippa et al. by examining the effects of dietary composition on serum pro/anti-inflammatory markers. The DII calculation depends on pro-inflammatory macro/micro nutrients such as carbohydrates, proteins, fats, saturated fatty acids, iron, cholesterol, vitamin B_{12}, and anti-inflammatory nutrients such as monounsaturated fatty acids, polyunsaturated fatty acids, dietary fiber, caffeine, vitamin A, beta carotene, vitamin D, vitamin E, B vitamins (thiamine, riboflavin, niacin, vitamin B_6, folic acid), vitamin C, magnesium, zinc, selenium, magnesium, zinc, selenium, and alcohol. A negative DII value indicates that the diet has anti-inflammatory potential, while a positive value means the diet's pro-inflammatory potential (7).

2.4. Mediterranean Diet Adherence Screener (MEDAS)

MEDAS was used to measure individuals' adherence to MD. The scale was developed by Martinez-Gonzalez et al. and was used for the first time in the PREDIMED study (19). Turkish validity and reliability study was conducted by Pehlivanoğlu et al (20). The scale consists of 14 questions about food consumption habits, and preference for white meat over red meat or olive oil over butter-margarine. Individuals can score 0 or 1 point for each question according to their answers. A score of 7 and above indicates acceptable adherence and a score of 9 and above indicates high adherence to the Mediterranean diet (19, 20).

2.5. Statistical Analysis

IBM SPSS Statistics for Windows 26.0 (IBM Corp., Armonk, NY, USA) program was used in the statistical analyses. The descriptive data were presented as frequencies and percentages. Shapiro-Wilk test was used to determine the normal distribution. Mann-Whitney U test and Kruskal-Wallis H-test were used to compare independent groups (21). Regression analysis was used to determine the effect between variables (17). The statistical significance level was accepted as $p<0.05$.

3. Results

The average age of the students was 21.60±2.24 years, and 52.3% were males. The average BMI was 23.97±2.63 kg/m^2. Among the students, 95.5% were single, 93.5% did not have any chronic diseases, 49.2% did not smoke, and 86.1% did not use alcohol. Half of the (50.7%) students had a low adherence to MD (Table 1).

Table 1. Descriptive Statistics of The Demographic and Nutritional Findings of The University Students

	Male		Female		Total	
	n	%	n	%	n	%
Age (*X*±*SD*)	21.63±2.39		21.56±2.06		21.60±2.24	
BMI (*X*±*SD*)	24.85±2.30		23.01±2.64		23.97±2.63	
Marital Status						
Married	15	3.0	18	4.0	33	3.5
Single	482	97.0	435	96.0	917	95.5
Chronic Disease						
Yes	26	5.2	36	7.9	62	6.5
No	471	94.8	417	92.1	888	93.5
Smoking						
Yes	272	54.7	211	46.6	483	50.8
No	225	45.3	242	53.4	467	49.2
Alcohol Consumption						
Yes	104	20.9	28	6.2	132	13.9
No	393	79.1	425	93.8	818	86.1
Average Daily Water Consumption (X±*SD*)	2.02±0.48		1.94±0.42		1.98±0.45	
Food Allergy						
Yes	34	6.9	20	4.4	54	5.7
No	462	93.1	433	95.6	897	94.3
Mediterranean Diet Adherence Status						
Low	280	56.3	202	44.6	482	50.7
High	217	43.7	251	55.4	468	49.3

Median MEDAS score was statistically higher in female students [7 (0-14)] compared to males [6 (0-14)] (U=91108; p<0.001) and in non-smokers [7 (0-14)] compared to smokers [6 (1-12)] (U=97463; p<0.001). A statistically significant negative correlation (s= -0.194; p<0.001) was determined between MEDAS scores and BMI. As the BMI values increased, MEDAS scores decreased by 19.4% (Table 2).

The correlations between energy, macro- and micro-nutrient intakes, and the MEDAS scores were given in Table 3. A negative, very weak correlation was found between MEDAS scores and carbohydrates (g) intake (s=-0.088; p<0.01) and cholesterol (mg). Significant positive very weak correlations were determined between the MEDAS scores and Polyunsaturated Fat (PUFA) (g), Omega-3 (g), and dietary fiber (g). In other words, as adherence to the MD increases, consumption of PUFA, Omega-3, and dietary fiber increases, and carbohydrate intake decreases. Positive and very weak correlations were found between MEDAS scores and vitamin A (µg) (s=0.107; p<0.01), vitamin E (mg) (n=0.084; p<0.05), carotene (mg) (s=0.115; p<0.001), vitamin B_6 (mg) (s=0.128; p<0.001), biotin (µg) (s=0.102; p<0.01), folate (µg) (s=0.076; p<0.05), vitamin E (mg) (s=0.084; p<0.05), vitamin C (mg) (s=0.089; p<0.01), potassium (s=0.090; p<0.01), magnesium (s=0.083; p<0.01) 0.05), phosphorus (s=0.076; p<0.05), chlorine (s=0.066; p<0.05), iodine (s=0.142; p<0.001) intakes. This indicated that as adherence to the MD increases, vitamin A, vitamin E, carotene,vitamin B_6, biotin, folate, vitamin E, vitamin C, potassium, magnesium, phosphorus, chlorine, iodine consumption increases (Table 3).

Table 2. Comparison of MEDAS Score and DII According to Demographic and Nutritional Findings of University Students

		MEDAS	DII
Sex		**Median (min-max)**	**Median (min-max)**
Female		7 (0-14)	0.05 (-1.95-4.85)
Male		6 (0-14)	0.07 (-1.73-4.38)
U		**91108**	-0.718
p		**<0.001**	0.473
Age	**s**	0.005	0.005
	p	0.890	0.868
BMI	**s**	**-0.194**	-0.009
	p	**<0.001**	0.773
Marital Status			
Married		7 (2-13)	0.16 (-1.64-2.04)
Single		6 (0-14)	0.05 (-1.95-4.85)
U		13006.5	13780
p		0.166	0.383
Chronic Disease			
Yes		7 (1-11)	0.05 (-1.59-3.61)
No		6 (0-14)	0.06 (-1.95-4.85)
U		26793.5	26552
p		0.723	0.640
Smoking			
Yes		6 (1-12)	0.04 (-1.95-4.85)
No		7 (0-14)	0.08 (-1.95-4.73)
U		**97463**	107695.5
p		**<0.001**	0.229
Alcohol Consumption			
Yes		7 (2-12)	0.22 (-1.64-3.4)
No		6 (0-14)	0.03 (-1.95-4.85)
U		50515	51418.5
p		0.231	0.380
Food Allergy			
Yes		6 (2-13)	0.39 (-1.48-3.61)
No		6 (0-14)	0.05 (-1.95-4.85)
U		24115	22658
p		0.979	0.441
Mediterranean Diet Adherence Status			
Low		-	0.19 (-1.68-4.85)
High		-	-0.08 (-1.95-4.70)
U		-	105765.5
p		-	0.097

MEDAS: the Mediterranean Diet Adherence Screener, DII: Dietary Inflammatory Index

U: Mann-Whitney U Test, *H: Kruskal-Wallis H Test*, *s*: Spearman's Rank Differences Correlation Coefficient

*p<0.05

Table 3. Correlation Between University Students' Energy, Macro- and Micro-Nutrient Values and MEDAS Scores

	MEDAS	
Diet component	**s**	**p**
Energy (kcal)	-0.027	0.410
Protein (g)	0.049	0.135
Carbohydrate (g)	**-0.088**	**0.007**
Total fat (g)	0.020	0.537
SFA (g)	-0.010	0.765
MUFA (g)	0.016	0.625
PUFA (g)	**0.080**	**0.014**
Omega-3 (g)	**0.090**	**0.006**
Omega-6 (g)	0.072	0.027
Cholesterol (mg)	**0.078**	**0.017**
Dietary fiber (g)	**0.069**	**0.033**
Cafein (mg)	-0.048	0.140
Vitamin A (µg)	**0.107**	**<0.001**
Vitamin D (µg)	0.024	0.468
Vitamin E (mg)	**0.084**	**0.010**
Carotene (mg)	**0.115**	**<0.001**
Thiamine (mg)	0.006	0.848
Riboflavin (mg)	0.040	0.214
Niacin (mg)	0.030	0.361
Vitamin B6 (mg)	**0.128**	**<0.001**
Biotin (µg)	**0.102**	**0.002**
Folate (µg)	**0.076**	**0.019**
Vitamin B12 (µg)	-0.027	0.403
Vitamin C (mg)	**0.089**	**0.006**
Sodium (mg)	0.049	0.132
Potassium (mg)	**0.090**	**0.005**
Calcium (mg)	0.047	0.147
Magnesium (mg)	**0.083**	**0.011**
Phosphorus (mg)	**0.076**	**0.019**
Chlorine (mg)	**0.066**	**0.041**
Iron (mg)	0.039	0.227
Zinc (mg)	-0.024	0.457
Copper (mg)	0.040	0.215
Fluorine (µg)	-0.037	0.250
Iodine (µg)	**0.142**	**<0.001**
Selenium (µg)	0.036	0.269

MEDAS: the Mediterranean Diet Adherence Screener,
s: Spearman's Rank Differences Correlation Coefficient
*p<0.05

The correlation between MEDAS and DII scores was given in Table 4. A statistically significant negative but very weak correlation (s=-0.068; p<0.05) was found between the MEDAS scores and DII. As the MEDAS scores increased, DII decreased by 6.8% (Table 4).

Regression analysis was performed to determine the effect size between MEDAS scores and DII (Table 5). When the coefficient of determination is examined, MEDAS scores explain about 0.4% of the change in the DII scores. The effect of MEDAS scores on DII scores was not statistically significant (F=3.771; p>0.05) (Table 5).

Table 4. Correlation Between MEDAS Score and DII

		MEDAS	DII
MEDAS	**s**	1.000	-0.068
	p	.	0.035*
DII	**s**	-0.068	1.000
	p	0.035*	.

MEDAS: the Mediterranean Diet Adherence Screener, DII: Dietary Inflammatory Index
s: Spearman's Rank Differences Correlation Coefficient
*p<0.05

Table 5. Effect of MEDAS Scores on DII

	Model		SE	t	p-value	F	p-value
DII	(Constant)	0.497	0.113	4.392	<0.001	3.771	0.052
	MEDAS	-0.032	0.016	-1.942	0.052		
	R=0.063; R^2=%0.4; Adjusted R^2=%0.3						

MEDAS: the Mediterranean Diet Adherence Screener, DII: Dietary Inflammatory Index
*p<0.001

4. Discussion

The 24-hour food dietary recalls of university students participating in the present study were examined to determine their adherence to the MD and the inflammatory index of their diets. The average energy consumed by the students was 1465.04±451.32 kcal/day. According to dietary reference intakes (DRI), protein, carbohydrate, and fat consumption were found to be adequate at 82%, 84.8%, and 80%, respectively (Appendix 1). Half of the students had low adherence to the MD as measured by MEDAS, and there was a decrease in their MEDAS scores as BMI increased. The dietary inflammatory potential of the students did not differ according to sex and BMI.

According to sex, adherence to the MD of the males was found to be lower compared to females. Similarly, another recent study conducted on university students in Turkey found that female students had higher adherence to the MD (22). Contrarily, in another cross-sectional study, adherence to the Mediterranean diet was found to be higher in male university students, although it was not statistically significant (23). It is advocated that women have a better and healthier dietary profile than men (24, 25). The differences between the male-female attitudes towards healthy eating, beliefs, and awareness may be an explanatory factor for the sex differences in dietary adherence (26). Following an education about the MD in hypercholesterolemic individuals, while men did not change their food consumption, women did (27). High adherence of women to the MD in our study may be explained by a similar attitude.

In this study, half of the students were non-smokers, non-smokers had higher adherence to the MD. Hadjimbei et al. reported that students who did not smoke were more likely to pursue the MD (23). Trichopoulou et al., on the other hand, did not find a relationship between smoking and adherence to the MD in their study including 22,043 adults (28). Since the MD is recommended as a healthy nutritional model, it is expected that individuals who adheres to the MD tend to be non-smokers as a manifestation of a healthy lifestyle behavior.

The mean BMI of the students was 23.97±2.63 kg/m^2 in the present study, and adherence to the MD decreased by 19.4% as their BMI increased. In a recent study by Shatwan et. al. found that BMI and waist circumference decreased as adherence to the MD increased (29). In a meta-analysis evaluating the risk of obesity with the MD, risk of obesity decreased by 9% as MD adherence increased (30). Studies examining the relationship between obesity and adherence to MD have addressed several possible mechanisms (30, 31). First, the MD may provide satiety and reduce energy intake with its high fiber content (31). Second, its low glycemic index content may lead to lesser insulin responses which reduce food intake and increase adipose tissue mobilization (30, 31). Moreover, the MD includes foods high in phenolic content, such as nuts, red wine, vegetables, fruits, and whole grains. Although the evidence for the effects of polyphenols on obesity is insufficient, possible mechanisms such as stimulation of ß-oxidation, energy expenditure by induced thermogenesis in brown adipose tissue, and increased lipolysis have been suggested (32). This evidence from the literature supports our results and explains the lower BMI in students with high adherence to the MD.

In the present study, adherence to the MD was associated with increased PUFA, omega-3, dietary fiber intake, and decreased carbohydrate and cholesterol consumption. Simultaneously, adherence to the MD was related to increased vitamin A, vitamin E, carotene, vitamin B_6, biotin, folate, vitamin E, vitamin C, potassium, magnesium, phosphorus, chlorine, and iodine intake. A study by Peng et al. concluded that daily energy and dietary fiber intake increased with high adherence to the MD. The intake of vitamins A, E, C, B_1, B_2, B_3, B_6, B_{12}, folate, and minerals such as calcium, iron, magnesium, phosphorus, potassium, sodium, zinc, and copper were also been reported to increase (33). In a study conducted in Turkey, a positive relationship was found between adherence to the MD and daily energy, carbohydrate, protein, fat, dietary fiber, vitamins C, B_1, B_2, B_3, B_6, folate, potassium, calcium, magnesium, phosphorus, iron, and zinc intakes (34). In Mediterranean countries, the energy requirement is met from proteins and fats mostly, while carbohydrate intake is known to be less (35). However, in our study, protein and total fat intake were not related to adherence to the MD.

Higher diet quality is associated with increased dietary anti-inflammatory potential. In one study, it was found that as the DII score increased, adherence to the MD decreased. As the DII score increased, total dietary antioxidant capacity and protein, PUFA, fiber, magnesium, C, E, B_6, B_2, and B_1 vitamins intake, and consumption of fruit, vegetables, legumes, and fish decreased. Meanwhile, total fat, MUFA, saturated fat (SFA), calcium intake, and consumption of dairy products, cereals, meat, pastries, cakes, and sweets increased (36).

The protection against diseases associated with chronic low-grade inflammation provided by high adherence to the MD may be related to the antioxidant and anti-inflammatory properties of the MD (37). A recent study reported that the most critical core food group in diversifying the MD was vegetables, followed by fruits and nuts (38). The MD is rich in antioxidants, including the high content of MUFA, dietary fiber, fruits, vegetables, extra virgin olive oil, nuts, and oilseeds. The rich antioxidant content of the MD and limited consumption of SFA's may be protective against chronic low-grade inflammation-related diseases such as obesity, diabetes mellitus, and cardiovascular diseases, as affecting the serum lipid profile, blood pressure, endothelial function, and insulin secretion positively (39, 40, 41). Therefore, if dietary diversity is provided with certain functional foods such as fish, olive oil, red wine, and nuts, the effectiveness of MD may be maximized (38).

In the present study, the inflammatory potential of the diet differed according to sex and BMI, but half of the students (50.7%) did not adhere to the MD. Still, as students' adherence to the MD increased, a 6.8% decrease in dietary inflammatory potential was detected. However, this relationship lost its significance after the regression analysis. In a study by Riuz-Canela et. al. with 7236 participants aged 55-80 years, a negative association was observed between adherence to the MD and DII (42). In a prospective study using data from the Melbourne Collaborative Cohort Study, an inverse relationship was found between DII and the MEDAS scores (15). Similar to our results, Meinilä et al. also found no relationship between DII and the MEDAS scores (43). As mentioned earlier, the MD is recognized as an anti-inflammatory diet model, and studies showing improvements in systemic inflammatory markers with increased adherence to the MD provide evidence for this idea (44, 45).

5. Conclusion and Recommendations

This study consists of a large sample with a balanced male-female distribution. In addition, face-to-face data collection by experienced researchers is the strength of our study. There are also limitations of our study. As this is an observational study, the influence of unknown confounding factors can be overlooked. In addition, the DII obtained from the food records was not compared to biochemical inflammatory markers. Therefore, confirmation of the inflammatory potential of the MD could not be made. Since the 24-hour food recall may not be sufficient to determine the dietary patterns of individuals, the frequency of food consumption may also need to be evaluated. Finally, since the study was conducted on university students, the results may not be generalizable to the overall population.

In this study, it was determined that as the BMI increased, the adherence to the MD decreased. The increased adherence to the MD was found to be related to rising PUFA, omega-3, and dietary fiber besides antioxidant-effective vitamin-minerals, and decreasing carbohydrate and cholesterol consumption. Low adherence to the MD was found to be associated with a reduction in dietary inflammatory potential. In conclusion, the high MUFA, dietary fiber, fruits, vegetables, extra virgin olive oil, nuts, and oilseeds content of the MD may affect the anti-inflammatory potential of the diet and be protective against chronic inflammation-related diseases. There is a need for more comprehensive cohorts and intervention studies to evaluate the relationship between compliance with anti-inflammatory diet models such as the MD and the risk of obesity and chronic disease in university students.

6. Contribution to the Field

This study contributes to the literature by examining the relationship between adherence to the MD and the dietary inflammatory potential of university students in Turkey through their energy, and macro- micro-nutrient intake. The high MUFA, dietary fiber, fruits, vegetables, extra virgin olive oil, nuts, and oilseeds content of the MD may have the anti-inflammatory potential and may be protective against chronic inflammation-related diseases.

Ethical Aspect of the Research

Oral and written consent was obtained from the volunteer participants who agreed to participate in the study, and their identities were kept confidential. Ethical approval of the study was obtained from Uskudar University Non-Interventional Research Ethics Committee with the number 61351342/January 2022.

Conflict of Interest

This article did not receive any financial fund. There is no conflict of interest regarding any person and/or institution.

Authorship Contribution

Concept: MA, NYA; **Design:** MA, NYA; **Supervision:** MA, NYA; **Funding:** None; **Materials:** None; **Data Collection/ Processing:** ETS, HC, EC; **Analysis/Interpretation:** ETS, HC, EC; **Literature Review:** MA, NYA, ETS, HC, EC; **Manuscript Writing:** MA, NYA, ETS, HC, EC; **Critical Review:** MA, NYA, ETS, HC, EC.

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