

Assessment of the Correlation Between Anthropometric Measurements, Mediterranean Diet and Nutritional Habits of Students*

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Abstract

Aim: In the study, the aim was to assess the possible correlation between the Mediterranean diet quality index with anthropometric measurements by identifying the ability of students attending Tekirdağ Namık Kemal University Department of Nutrition and Dietetics to apply academic knowledge related to healthy lifestyles to their own lives and their healthy eating obsessions.

Method: The sample for the study comprised a total of 174 students who volunteered to participate, aged between 18-24 years abiding by the study participation criteria, including 54 in the fourth year, 65 in the third year, and 59 in the second year of university. The survey form was applied to students participating in the research with the face-to-face interview method. Additionally, the anthropometric measurements and body composition of students completing the survey form were determined.

Results: As a result of these assessments, students had a mean Mediterranean Diet Quality Index of 5.3 ± 2.95 and mean ORTO-11 scale point of 24.75 ± 6.48 . The mean body weight of students was 59.7 ± 11.1 kg and mean BMI was 21.72 ± 3.1 . In our study, it was determined that as the level of class increased, compliance with the Mediterranean diet increased. It was found that as the Mediterranean diet quality index scores of the students increased, BMI values and the ORTO-11 scale scores decreased ($p < 0.05$).

Conclusion: It has been determined that compliance with the Mediterranean diet positively affects the body weight, BMI and body composition of individuals. Moreover, there was a determined positive correlation between the orthorexic behaviors and compliance with the Mediterranean diet.

Keywords: Mediterranean diet, body mass index, nutrition disorders.

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ETHICAL STATEMENT: This research was conducted in accordance with the principles of the Declaration of Helsinki. For the research, permission was obtained from the Tekirdağ Namık Kemal University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee, dated 30.10.2019 and numbered 2019.184.10.05.

Öğrencilerin Antropometrik Ölçümleri ile Akdeniz Diyeti ve Beslenme Alışkanlıkları Arasındaki İlişkinin Değerlendirilmesi

Öz

Amaç: Çalışmada, Tekirdağ Namık Kemal Üniversitesi Beslenme ve Diyetetik bölümünde öğrenim gören öğrencilerin Akdeniz Diyet Kalite İndeksi ve sağlıklı yaşam biçimleriyle ilgili akademik bilgilerini kendi yaşamlarına uygulayabilme yetenekleri ve sağlıklı beslenme takıntısının saptanarak Akdeniz Diyet Kalite İndeksi ile antropometrik ölçümler arasındaki olası ilişkinin değerlendirilmesi amaçlanmıştır.

Yöntem: Çalışmanın örneklemini çalışmaya katılım kriterlerini karşılayan 18-24 yaş arasında gönüllü olan dördüncü sınıflarda öğrenim gören 54, üçüncü sınıflarda öğrenim gören 65 ve ikinci sınıflarda öğrenim gören 59 öğrenci olmak üzere toplamda 174 öğrenci oluşturmuştur. Araştırmaya katılan öğrencilere yüz yüze görüşme yöntemiyle anket formu uygulanmıştır. Ayrıca anket formu uygulanan öğrencilerin antropometrik ölçümleri ve vücut kompozisyonu saptanmıştır.

Bulgular: Öğrencilerin Akdeniz diyet kalite indeksi ortalamasının; $5,3 \pm 2,95$; ORTO-11 ölçeği puan ortalamalarının ise $24,75 \pm 6,48$ olduğu bulunmuştur. Öğrencilerin ortalama vücut ağırlığı $59,7 \pm 11,1$ kg ve beden kitle indeksi (BKİ) ortalamaları ise $21,72 \pm 3,1$ olarak saptanmıştır. Araştırmamızda öğrenim görülen sınıf düzeyi arttıkça Akdeniz diyetine uyumun arttığı belirlenmiştir. Öğrencilerin Akdeniz diyet kalite indeksi puanları arttıkça BKİ değerlerinin ve ORTO-11 ölçeği puanlarının azaldığı tespit edilmiştir ($p < 0,05$).

Sonuç: Akdeniz diyetine uyumun; bireylerin vücut ağırlığı, BKİ ve vücut kompozisyonunu olumlu yönde etkilediği belirlenmiştir. Ayrıca ortorektik davranışlar ile Akdeniz diyetine uyum arasında pozitif bir ilişki saptanmıştır.

Anahtar Sözcükler: Akdeniz diyeti, beden kitle indeksi, beslenme bozuklukları.

Introduction

The Mediterranean diet may be defined as increasing consumption of plant-derived nutrients (e.g., oily seeds, vegetables, unrefined cereals and fruit), consumption of moderate to high amounts of seafood and fish, low amounts of red meat and full-fat milk products, and abundant olive oil consumption as the source of fat in the diet^{1,2}. There are many studies indicating that higher rates of adherence to the Mediterranean diet may have many beneficial effects on obesity, diabetes, cardiovascular disease (CVD), a variety of cancer types, cognitive function and musculo-skeletal health³⁻⁵.

Orthorexia nervosa (ON) is an eating disorder defined by excessive mental effort in relation to healthy foods⁶. Many studies have stated that they may have an increased risk of ON development as a result of nutritional experts and students in the nutrition and dietetics department having knowledge about healthy eating, weight control, and body composition^{6,7}. This study rated the

Mediterranean diet points based on responses of students attending Tekirdağ Namık Kemal University Department of Nutrition and Dietetics, abiding by the study inclusion criteria and accepting participation in the research. The aim was to identify a possible correlation between these points with eating habits, anthropometric measurements, and healthy eating obsession.

Material and Method

Sample for the Research

This research was conducted in accordance with the principles of the Declaration of Helsinki. For the research, permission was obtained from the Namık Kemal University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee, dated 30.10.2019 and numbered 2019.184.10.05.

This study was conducted as descriptive research and was completed from January 2020 to May 2021. The sample for the study comprised 174 students attending second, third, and fourth years in Tekirdağ Namık Kemal University Department of Nutrition and Dietetics, aged 24 years and younger, who volunteered, were not pregnant or breastfeeding, did not have congestive heart failure, and had no invasive metal implant in their body.

Measurement Methods Used in the Research

Each student included in the study was first given information about the study, and each student provided written consent stating their voluntary participation at the start of the research. All students included within the scope of the research had the survey form developed related to the topic applied by the researcher with the face-to-face interview technique during lesson hours. At the end of the study, the anthropometric measurements of individuals were taken by the researcher in the Tekirdağ Namık Kemal University Nutrition and Dietetics Laboratory and recorded on the survey form.

The study used the Mediterranean Diet Quality Index (KIDMED) form developed by Serra-Majem et al. (2004) with the aim of assessing the adherence of students to the Mediterranean diet⁸.

The ORTO-11 scale, prepared by Bratman (2000) and adapted to Turkish by Arusoğlu et al. (2008) was used with the aim of determining student obsessions about healthy eating^{9,10}. The heights of students were measured with a stadiometer (telescopic height meter), while waist, hip and neck circumference were measured with an inflexible tape measure. Body weight (kg), BMI; kg/m², body muscle percentage (%), body muscle mass (kg), body fat percentage (%), fat mass (kg), body water percentage (%), body water (kg) and basal metabolism rate (BMR) were measured using a 'Tanita MC780' brand bioelectrical impedance analyzer (BIA).

Statistical Analysis of Data

Analysis of data used the SPSS program. Assessment of the sociodemographic characteristics (age, sex, class, etc.) of students used descriptive statistics like number and percentage. The relationships between mean KIDMED and ORTO-11 scale points with anthropometric measurements were assessed with correlation analysis. Comparison of KIDMED and ORTO-11 mean points with sociodemographic characteristics used the significance of difference between two means test and variance analysis. The significance level was taken as 0.05, with $p < 0.05$ indicating significant differences and $p > 0.05$ accepted as the difference not being significant.

Results

Table 1 gives the mean KIDMED index and ORTO-11 scale points for students according to class. As the class level of students increased, the mean KIDMED index points statistically significantly increased, while the mean ORTO-11 scale points statistically significantly reduced ($p < 0.05$).

Table 1. Comparison of mean KIDMED Index and ORTO-11 Scale points for students according to year

	2nd year	3rd year	4th year	Total (n=174)	F	p*
	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$		
KIDMED Index	3.61 \pm 2.3 ^{a,b}	5.43 \pm 2.72 ^{a,c}	7.14 \pm 2.8 ^{b,c}	5.3 \pm 2.95	24.806	<0.001
ORTO-11 scale	30.33 \pm 2.25 ^{d,e}	25.95 \pm 4.78 ^{d,f}	16.5 \pm 2.28 ^{e,f}	24.75 \pm 6.48	222.9	<0.001

* One-way ANOVA used to calculate p values

Tukey; a: $p < 0.001$ between 2nd year and 3rd year, b: $p < 0.001$ between 2nd year and 4th year, c: $p < 0.001$ between 3rd year and 4th years, d: $p < 0.001$ between 2nd year and 3rd year, e: $p < 0.001$ between 2nd year and 4th year, f: $p < 0.99t$ between 3rd year and 4th year

\bar{x} : mean, SD: standard deviation

The KIDMED index mean points according to skipping main meals, smoking and alcohol consumption for students participating in the study are given in Table 2. Students who did not skip main meals and who did not smoke had higher adherence to the Mediterranean diet. Students who did not consume alcohol had higher KIDMED index points compared to students who consumed alcohol. However, this was not identified to have statistical significance ($p > 0.05$).

Table 2. Mean KIDMED index points according to skipping meals and smoking and alcohol consumption of students

	KIDMED Index mean points				
	Yes (x±SD)	No (x±SD)	F	df	p**
Skipping main meal	4.96±2.89	5.87±2.97	0.381	172	0.048*
Smoking	4±2.57	5.54±2.96	1.649	172	0.012*
Alcohol consumption	4.98±2.93	5.45±2.95	0.085	172	0.328

**Independent Samples T Test, * <0.05

The mean height of students participating in the study was 165.3 ± 7.6 cm. Apart from height, all other measurements displayed significant differences according to KIDMED groups. The Tukey test was performed with the aim of determining which groups caused these differences. The mean body weight of students was 59.7 ± 11.1 kg. The body weights of students showing good and moderate adherence to the Mediterranean diet were identified to be significantly lower compared to students with poor adherence to the diet ($p<0.01$). The mean BMI of students was 21.72 ± 3.1 kg/m². The BMI values of students with good and moderate adherence to the Mediterranean diet were identified to be significantly lower compared to students with poor compliance ($p<0.01$). The mean waist circumference of students was 71.41 ± 8.67 cm. The waist circumferences of students with good and moderate adherence to the Mediterranean diet were significantly lower compared to students with poor adherence to this diet ($p<0.01$). The mean hip circumference of students was 96.91 ± 7.12 cm. The hip circumference values for students with good and moderate adherence to the Mediterranean diet were identified to be significantly lower compared to students with poor adherence to this diet ($p<0.01$). The waist-hip ratio of students was 0.73 ± 0.06 . The waist-hip ratio of students with good adherence to the Mediterranean diet was identified to be significantly lower compared to students with poor adherence to diet ($p<0.05$). The waist-height ratio of students was 0.42 ± 0.047 . The waist-height ratios of students with good and moderate adherence to the Mediterranean diet were identified to be significantly lower compared to students with poor adherence to the Mediterranean diet ($p<0.01$). The mean neck circumference of students was 31.48 ± 2.5 cm. The neck circumference values for students with good and moderate adherence to the Mediterranean diet were identified to be significantly lower compared to students with poor adherence ($p<0.05$). The mean fat percentage of students was identified to be 22.89 ± 6.09 . The fat percentages of students with good and moderate adherence to the Mediterranean diet were identified to be significantly lower compared to students with poor adherence ($p<0.05$). The fat-free body percentage of students was identified to have a mean value

77.13±6. The fat-free body percentages of students with good and moderate adherence to the Mediterranean diet were identified to be significantly higher compared to students with poor adherence ($p < 0.05$). The fluid percentage of students was identified as 55.5±4.94. The fluid percentages of students with good and moderate adherence to the Mediterranean diet were identified to be significantly higher compared to students with poor adherence ($p < 0.05$). Students with good and moderate adherence to the Mediterranean diet were identified to have significantly lower BMR compared to those with poor adherence to this diet ($p < 0.01$).

In line with the results of the regression analysis, the KIDMED index points of students were affected at 60% rates by class, BMI value and ORTO-11 scale points and can be explained by these variables (Table 3).

Table 3. Regression analysis of KIDMED scale points and effective factors

Variables	KIDMED Scale							
	β	p	95% CI		R	R ²	F	p
Fixed	16.39	0.00	12.43	20.35	0.78	0.60	85.67	0.00
Student year	0.29	0.01	0.44	1.72				
BMI	-0.59	0.00	-0.64	-0.46				
ORTO-11 Scale	-0.21	0.02	-0.18	-0.02				

Finally, as the class level attended by students in this study increased, good compliance with the Mediterranean diet increased; as BMI values increased, their adherence to the Mediterranean diet decreased; and as the healthy eating obsession identified by the ORTO-11 scale increased, they had better adherence to the Mediterranean diet.

Discussion

According to the index results, 28.7% of students had poor diet quality (≤ 3 points), 43.1% had moderate quality (4-7 points) and 28.2% had good diet quality (≥ 8 points). La Fauci et al. (2020) stated that 23.5% had poor, 53.4% had moderate, and 23.1% had good points for KIDMED in a study of young people aged 17-25 years¹¹. Zerón-Ruggerio et al. (2019) studied university students aged 18-25 years in Spain and found 4.9% had poor adherence, 50.7% had moderate and 44.4% had good adherence to the Mediterranean diet¹². Our findings on index results are in agreement with previous studies, as described above. There are also studies in which different results were obtained from this study. The study by Galan-Lopez et al. (2019) identified 41.67% of individuals had poor adherence, 44.05% had moderate and 14.28% had good adherence to the Mediterranean

diet¹³. Sönmez (2021) identified that 11.5% of students had poor adherence, 73.3% had moderate and 15.2% had good adherence to the Mediterranean diet in a study of university students in Turkey¹⁴. The differences obtained in the studies may be due to different countries, different dietary habits, and this study was carried out only with the students of the nutrition and dietetics department.

In the study by Gümüş and Yardımcı (2019), KIDMED points of university students were 3.9 ± 2.4 , while Okur and Karaoğlu (2019) stated that points on the adherence to the Mediterranean diet scale were 6.9 ± 0.2 for employees in a health sciences faculty^{15,16}. In the literature, similar to studies researching adherence to the Mediterranean diet, as the nutritional information of students increased, their adherence to the Mediterranean diet was identified to significantly increase.

In the study, as the class level attended by students increased, the mean ORTO-11 scale points were statistically significantly reduced ($p < 0.05$). As the adherence of students to the Mediterranean diet increased, their orthorexia behavior was identified to significantly increase ($p < 0.05$). A study by Arslantaş et al. (2017) researched orthorectic tendencies among nursing students and found mean ORTO-11 scale points were 27.34 ± 4.53 ¹⁷. Another study including school of health students reported mean points were 26.95 ± 5.11 ¹⁸. Garipoğlu et al. (2019) stated that 76.7% of female students attending the nutrition and dietetics department had orthorectic tendencies¹⁹. Another study performed with male students from the nutrition and dietetic department identified that 70.6% displayed orthorectic tendencies²⁰. Pulat Demir et al. (2020) studied with 230 students of nutrition and dietetics department in İstanbul and observed that 79.1% of the students had the risk of orthorexia nervosa²¹. Studies in health departments show the risk of development of ON may be high, especially among students attending the nutrition and dietetics department. This study is parallel to the other studies supporting the view that as the nutritional information of students increases, their orthorectic tendencies significantly increase.

In this research, when the students skipping main meals are assessed according to KIDMED index points, students who skipped main meals had mean points of 4.9 ± 2.8 , while mean points of students who did not skip meals were 5.8 ± 2.9 . Similar to this study, the research by Aşit (2018) found individuals in the group with low Mediterranean diet scores had higher rates of skipping meals²².

When the smoking status of students in this research is assessed in terms of KIDMED index points, mean points for students who smoked appeared to be lower than students who did not smoke. Similar to this study, studies by Schroder (2011) and Carter (2010) found individuals with high Mediterranean diet scores had lower smoking rates compared to those with low diet scores^{23,24}.

In this study, students with better adherence to the Mediterranean diet had statistically significantly reduced body weight and BMI values, similar to the literature^{14,25}. Waist circumference ≥ 80 cm in women and ≥ 94 cm in men and waist/hip ratio ≥ 85 in women and ≥ 90 in men are risk factors for chronic ^{26,27}. The correlation between adherence to the Mediterranean diet with long-term weight and waist circumference variations was researched among participants in the Italian section of the European Prospective Investigation into Cancer and Nutrition and it was identified that increased adherence to the diet reduced the risk of waist circumference fattening and obesity²⁸. Another study performed with women stated there was a positive correlation between adherence to the Mediterranean diet and reduced waist circumference²⁹. Tzima et al. (2007) stated that as the Mediterranean diet score increased, the waist circumference, waist/hip ratio, and BMI of individuals were significantly reduced in a study with overweight and obese individuals³⁰. Similarly, in this study, the majority of female students at risk and all male students at risk appeared to be students with poor adherence to the Mediterranean diet. None of the students with good adherence to the diet was at risk in terms of hip/waist ratio. A study including adult women by Boghossian et al. (2013) identified that body fat percentages reduced as adherence to the Mediterranean diet increased³¹. In this study, the group with high body fat percentage, fat-free body mass, and BMR comprised the group with significantly poor adherence to the diet.

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Conclusion

Adequate and balanced nutrition is one of the most important factors in being able to sustain a healthy life. Students adhering to the healthiest known nutritional model of the Mediterranean diet appeared to have a normal BMI. Overweight or obese individuals may implement the Mediterranean diet to reach their ideal weight. The Mediterranean diet is also important in preventing the development of cardiovascular diseases. As the nutritional knowledge of students increased, they acted more consciously about healthy eating and adherence to the Mediterranean diet increased; hence, students should be given education through elective or mandatory lessons about adequate and balanced eating. Students should be encouraged to exercise regularly, a part of the Mediterranean diet model. It should be considered that orthorexia behavior may develop as the nutritional knowledge of students in the nutrition and dietetics department increases, as in the study. Factors causing the development of orthorectic behavior should be investigated in detail with qualitative research and interventional studies should be performed to prevent orthorectic behavior.

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