

## Turkish Adolescents' Adherence to the Mediterranean Diet

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**ABSTRACT** This study aims to examine nutritional status and KIDMED of adolescents, and to determine their relation with some parameters. The study sample included a total of 497 students selected from high schools. Of the participants, 52.5 percent were females (n=261) and 47.5 percent were males (n=236). To determine the KIDMED index of adolescents, the independent t-test was used for gender. One-way ANOVA was used for the variables of age and Body Mass Index (BMI). The adolescents' average score for KIDMED was  $4.65 \pm 2.38$ . Of them, thirty-one percent had "poor" diet quality ( $\leq 3$ ), 58.4 percent had "average" diet quality (4-7) and 10.6 percent had "good" diet quality ( $\geq 8$ ). MedDiet is effective in providing a healthy life. It is important that governmental policies encourage people to follow this diet to prevent future health problems.

### INTRODUCTION

The traditional Mediterranean diet (MedDiet) refers to dietary patterns typical of specific regions of the Mediterranean region in the early 1960s (Boskou 2016). The MedDiet is a plant-based diet that advises frequent consumption in large amounts of vegetables, fruits, cereals (preferably whole grain), legumes and nuts. The MedDiet also includes moderate consumption of fish and shellfish, white meat, eggs and dairy products (Bach-Faig et al. 2011; Boskou 2016).

Numerous epidemiological and experimental studies in nutrition have focused on the MedDiet because it is well known for its health benefits (Mariscal-Arcas et al. 2009; Trichopoulou et al. 2009; Konstantinidou et al. 2013; Opie et al. 2013).

There are many evidences that MedDiet products and their ingredients decrease some chronic diseases. These evidences confirm the findings of epidemiology studies that good adher-

ence to MedDiet provides protection against coronary heart disease, vascular health and hypertension, various types of cancer, arthritis, diabetes neurodegenerative diseases and increases academic performance. Also, not following a healthy MedDiet might increase the risk of those diseases. It may be effective in improving health status and reduce mortality (Trichopoulou et al. 2009; Couto et al. 2011; Lydakis et al. 2012; Costarelli et al. 2013; Estruch et al. 2013; Sofi et al. 2013).

Food systems around the world are changing rapidly, with profound implications for diets and food consumption outcomes (Reisch et al. 2013; Dernini and Berry 2015). Adolescents' food habits may be influenced by many factors because healthy nutrition practices during adolescence have the potential to confer significant long-term health benefits (Bibiloni et al. 2016). Adherence to the Mediterranean pattern is therefore important in improving overall health, while adolescents may be an important time for intervening and establishing long-term health behaviors (Hadjimbei et al. 2016). However, adolescents tend to follow a poor diet, marked by low consumption of fruits and vegetables and high consumption of fast food and sugar-sweetened beverages (Pelletier et al. 2014). This can influence not only their concurrent health but also their future risk for a number of chronic diseases at a later age (Atkins et al. 2014). Thus, the pattern

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has been gaining interest around the world and more people are interested in the health benefits it confers. This study aims to examine nutritional status and MedDiet, and to determine their relation with some parameters.

### METHODOLOGY

The study sample included a total of 497 students selected from high schools in the cities of K yrsehir and Antalya. Of the participants, 52.5 percent were females (n=261) and 47.5 percent were males (n=236). This study was conducted according to the guidelines stated in the Declaration of Helsinki protocols (World Medical Association). Written informed consent was obtained from all participants and also from their parents in the study. The research data was collected by researchers using a questionnaire and face-to-face interviews. The questionnaire was composed of two sections. The first includes demographic information, and the second is the Mediterranean Quality Index (KIDMED), a 16-item index. KIDMED, a practical and easily analyzable tool, was used to determine the adolescents' nutrition status. The KIDMED index ranges from 0 to 12 and includes 12 positive and 4 negative questions. The sums of the values from the administered test were classified into three levels of good ( $\geq 8$ ) or optimal MedDiet, average (4-7) or improvement needed to adjust to the MedDiet, and poor ( $\leq 3$ ) or poor diet quality (Serra-Majem et al. 2004). The questions on the KIDMED Index are shown in Table 2.

BMI was calculated using the formula:  
Body Weight (kg)/ Height ( $m^2$ )

The BMI percentile values were classified as follows:

- Less than five percent: "thinness"
- Greater than equal to five percent and less than fifteen percent: "underweight"

- Greater than equal to fifteen percent and less than eighty-five percent: "normal"
- Greater than equal to eighty-five percent and less than ninety-five percent: "overweight"
- Greater than equal to ninety-five percent: "obesity" (WHO 2007)

Gender, age and BMI were the main variables. Frequencies, mean values and standard deviations were calculated. For the statistical analyses of the data, tables were prepared to show mean, standard deviation ( $\bar{X} \pm SD$ ) and percentage (%) values. The KIDMED index was the dependent variable in the study, while gender, BMI and age were independent variables. To determine the KIDMED index of students, the independent t-test was used for gender. One-way ANOVA was used for the variables of age and BMI. Alpha levels of  $<0.05$  were used as the criteria to determine statistical significance.

### RESULTS

In the general sample, the mean age was  $15.90 \pm 1.01$  years, (females:  $15.79 \pm 0.97$  years, males:  $16.02 \pm 1.01$  years). The mean weight was  $58.56 \pm 10.73$  kg (females:  $54.04 \pm 7.70$  kg, males:  $63.55 \pm 11.39$  kg). The mean height was  $1.67 \pm 0.08$  m (females:  $1.62 \pm 0.06$  m, males:  $1.71 \pm 0.08$  m) (see Table 1).

The mean BMI value was  $20.92 \pm 2.99$  kg/ $m^2$  (females:  $20.42 \pm 2.66$  kg/ $m^2$ , males:  $21.47 \pm 3.24$  kg/ $m^2$ ). The BMI values showed that 6.8 percent of the males and 4.6 percent of the females were under "thinness", 7.2 percent of the males and 15.3 percent of the females were underweight, 64.3 percent of the males and 72.1 percent of the females were normal, 13.6 percent of the males and 5.7 percent of the females were overweight, and 8.1 percent of the males and 2.3 percent of the females were obese.

**Table 1: Baseline characteristics of study adolescents**

Variables	Male 236 (47.5%) $\bar{x} \pm s$	Female 261 (52.5%) $\bar{x} \pm s$	All 497 $\bar{x} \pm s$
Age (yr)	$16.02 \pm 1.01$	$15.79 \pm 0.97$	$15.90 \pm 1.01$
Weight (kg)	$63.55 \pm 11.39$	$54.04 \pm 7.70$	$58.56 \pm 10.73$
Height (m)	$1.71 \pm 0.08$	$1.62 \pm 0.06$	$1.67 \pm 0.08$
BMI (kg/ $m^2$ )	$21.47 \pm 3.24$	$20.42 \pm 2.66$	$20.92 \pm 2.99$
<i>BMI Categories</i>			
Thinness	6.8%	4.6%	5.6%
Underweight	7.2%	15.3%	11.5%
Normal	64.3%	72.1%	68.4%
Overweight	13.6%	5.7%	9.5%
Obese	8.1%	2.3%	5.0%

and 8.1 percent of the males and 2.3 percent of the females were obese (Table 1). Of the female participants, 6.3 percent, and 15.3 percent of the male participants were smoking cigarettes. Of the female participants, five percent and 15.7 percent of the male participants told that they were drinking alcohol.

As given in Table 2, the average KIDMED index score is  $4.65 \pm 2.38$  (male:  $4.64 \pm 2.42$ , female:  $4.66 \pm 2.35$ ). It was found that all three variables' average KIDMED index scores were average (4-7; male 57.9%, female 58.9%). Of the females, 11.5 percent, and of the males 9.7 percent had good KIDMED index scores ( $\geq 8$ ). These scores were highest for 16-year-olds (12.0%), and ranked second for those with normal body weight (10.9%). Average scores were statistically insignificant with regard to gender and body weight ( $p > .05$ ), but significant with regard to age ( $p < .05$ ).

Table 3 shows the results of the KIDMED index according to gender and age. The participant students were asked 16 statements, 12 positive statements and 4 negative statements, from the KIDMED index. More than fifty percent of the participants responded affirmatively to the positive statements 1 (68.4%), 7 (62.0%) 8 (74.8%) 9 (74.2%) 10 (51.1%) 11 (88.3%), 13 (70.4%) and 15 (56.1%), and negative statements 6 (54.1%)

and 16 (60.8%). Items 1, 2, 5, 6, 11, 14 and 16 were significant with regard to gender, and the items 1 and 3 were significant with regard to age ( $p < 0.05$ ).

## DISCUSSION

Adolescence is a critical period of transition to adulthood. During this period adolescents should gain healthy eating habits, which is important for the prevention of health problems that may occur in the future. Although Turkey is a Mediterranean country with a traditional Med-Diet, during the past few decades it has undergone substantial industrial and economic changes that have influenced dietary habits. Changes in eating habits relates to changes in lifestyle, social environment and other social factors. Particularly, social environments affect eating habits as one grows older (Dernini and Berry 2015). This study was conducted with adolescents to determine their nutritional status and MedDiet in relation to some parameters.

The students' average score on the KIDMED index was  $4.65 \pm 2.38$  with the average score range from 4-7. Similar studies found an average of 4.12 (Aboul-Enein and Bernstein 2014) and 6.0 (Hadjimbei et al. 2016).

**Table 2: KIDMED classifications assess the according to gender, age and body weight**

Variables	KIDMED						
	Mean $\pm$ SD	Poor ( $\leq 3$ )		Average (4-7)		Good ( $\geq 8$ )	
		n	%	n	%	n	%
<b>Gender</b>							
Male	$4.64 \pm 2.42$	74	31.4	139	57.9	23	9.7
Female	$4.66 \pm 2.35$	80	30.7	151	58.9	30	11.5
		t= 0.087		p=.930			
<b>Age</b>							
14/15 (n=216)	$4.90 \pm 2.34$	56	25.9	135	62.5	25	11.6
16 (n=150)	$4.76 \pm 2.31$	45	30.0	87	58.0	18	12.0
17 (n=96)	$4.35 \pm 2.39$	35	36.5	53	55.2	8	8.3
18 (n=35)	$3.45 \pm 2.61$	18	51.4	15	42.9	2	5.7
		F= 4.435		p=.004			
<b>BMI (kg/m<sup>2</sup>)</b>							
Thinness/Underweight (n=85)	$4.57 \pm 2.28$	29	34.1	46	54.1	10	11.8
Normal (n=340)	$4.65 \pm 2.44$	106	31.2	197	57.9	37	10.9
Overweight/obesity (n=72)	$4.72 \pm 2.25$	19	26.4	47	65.3	6	8.3
F=0.096 p=.99							
All	$4.65 \pm 2.38$	154	31.0	290	58.4	53	10.6

**Table 3: Adherence to the MedDiet (KIDMED) according to gender and age**

KIDMED evaluation	Statements	All	Gender		p- value	Age			p- value
			M	F		14- 15	16	17- 18	
Yes (%)			Yes (%)						
+1	1. Fruit or fruit juice daily	68.4	58.9	77.0	.000	73.1	69.3	59.5	.029
+1	2. Second serving of fruit daily	43.7	32.6	53.6	.000	49.1	42.0	36.6	.068
+1	3. Fresh or cooked vegetables daily	38.0	34.3	41.4	.106	40.3	42.7	29.0	.042
+1	4. Fresh or cooked vegetables >1/d	18.5	15.7	21.1	.122	22.7	16.7	13.7	.090
+1	5. Regular fish consumption (at least 2-3/ week)	21.3	16.1	26.1	.007	25.5	18.7	17.6	.139
-1	6. Fast-food (hamburger) restaurant >1/week	54.1	43.6	63.6	.000	51.4	60.7	51.1	.157
+1	7. Pulses >1/week	62.0	62.7	61.3	.747	58.8	65.3	63.4	.417
+1	8. Pasta or rice almost daily (e"5/week)	74.8	77.1	72.8	.267	73.1	71.3	71.0	.435
+1	9. Cereal or cereal product for breakfast	74.2	76.7	72.0	.235	78.2	71.3	71.0	.203
+1	10. Regular nut consumption (at least 2-3/week)	51.1	51.3	51.0	.944	55.6	52.0	42.7	.066
+1	11. Use of olive oil at home	88.3	84.7	91.6	.018	88.9	92.0	83.2	.068
-1	12. No breakfast	40.4	36.4	44.1	.084	39.8	37.3	45.0	.409
+1	13. Dairy product for breakfast	70.4	70.3	70.5	.969	68.1	74.0	70.2	.471
-1	14. Commercially baked goods or pastries for breakfast	46.3	40.7	51.3	.017	42.6	48.0	50.4	.325
+1	15. Two yoghurts and/or 40 g cheese daily	56.1	57.2	55.2	.649	51.9	62.7	55.7	.121
-1	16. Sweets and candy several times a day	60.8	52.5	68.2	.000	60.6	63.3	58.0	.660

M:Male, F:Female

When adolescents were evaluated according to gender, age and BMI, it was found, as a result of this study, that their adherence to MedDiet was low. This may increase health risks in the future. It was found that thirty-one percent of the students had a "poor" diet quality ( $\leq 3$ ), 58.4 percent had "average" diet quality (4-7) and 10.6 percent had "good" diet quality ( $\geq 8$ ). The KIDMED test has been done in different countries to examine nutritional status, and the levels of "good" ( $\geq 8$ ) nutritional quality varied by country. This may result from the different nutritional status of each country. However, most countries had "average" (4-7) nutritional quality (Serra-Majem et al. 2004; Mariscal-Arcas et al. 2009; Ayechu and Dura 2010; Erol et al. 2010; Lazarou et al. 2010; Farajian et al. 2011; Sahingöz and Sanlier 2011; Trave and Gandarias 2011; Toktas-Torun and Yildiz 2013; Roccaldo et al. 2014; Santomauro et al. 2014; Vassiloudis et al. 2014; Papadaki and Marvikaki 2015). This high rate derives from unhealthy eating habits and the lack of the MedDiet. A study by Arriscado et al. (2014) unlike other relevant studies, determined the percentage of those who were eating a "good" ( $\geq 8$ ) Mediterranean diet to be 46.7 percent.

In this study, the average KIDMED scores of female students were 58.9 percent and male students scored 57.9 percent. Of the females, 11.5 percent and 9.7 percent of the males had "good" ( $\geq 8$ ) scores. Some studies by Papadaki and Marvikaki (2015), Bibiloni et al. (2016) found good scores from males (23.6% and 32.0%, respectively) and from females (19.3% and 25.2%, respectively).

Examination of the KIDMED nutritional status showed that although women's levels of good MedDiet were higher than those of men, no significant difference between gender and mean KIDMED index scores was found ( $p > .05$ ). Previous some studies in Turkey have shown no statistically significant difference between the KIDMED scores by gender ( $p > .05$ ) (Farajian et al. 2011; Sahingöz and Sanlier 2011). This reveals that females, rather than males, favor the consumption of fruits and vegetables, fish and olive oil, as recommended by the MedDiet. When the KIDMED scores were analyzed according to age, it was found that of those who had "good" KIDMED scores, 11.6 percent were 14-15 years old, twelve percent were 16 years old, 8.3 percent were 17 years old and 5.7 percent were 18 years old. The findings show that as adolescents

get older they are freer to choose snack food or junk food and also tend to eat less regular meals. In this study, the percentage of those who had “good” ( $\geq 8$ ) KIDMED scores was 9.4 percent while this percentage was 8.3 percent in the study of Kontogianni et al. (2008), and it was only 4.3 percent in the study of Farajian et al. (2011). When the “average” KIDMED scores ( $4.65 \pm 2.38$ ) were analyzed according to age, it was found that KIDMED scores decreased as age increased. This is statistically significant ( $p < .05$ ). The scores were found  $5.72 \pm 2.33$  in Kabaran and Gezer’s (2013) study and  $4.8 \pm 2.1$  in the study of Kontogianni et al. (2008). These results reveal the need to improve adolescents’ nutritional status (Table 2).

With adolescents’ increasing body weights, obesity and related health problems such as cardiovascular diseases, diabetes and so on become more prevalent. According to this study, adolescents with a normal BMI had “average” KIDMED scores of  $4.65 \pm 2.44$ , while in a similar study done by Kontogianni et al. (2010) this value was found to be  $4.9 \pm 2.0$ . When adolescents are analyzed according to BMI, it was found that 11.8 percent of those who were thin/underweight, 10.9 percent of those who were normal and 8.3 percent of those who were overweight/obese had “good” ( $\geq 8$ ) KIDMED scores. There are also studies, which showed that obesity and being overweight were less prevalent among students with “good” ( $\geq 8$ ) KIDMED scores than students with “poor” ( $\leq 3$ ) KIDMED scores (Lazarou et al. 2010; Lydakis et al. 2012; Santomauro et al. 2014). KIDMED index scores can increase by decreasing BMI. This will improve levels of “good” MedDiet nutrition and positively affect health outcomes (Table 2).

This study resembles these studies in this regard. Female students consumed more fruits and vegetables, fish and olive oil than the males. This is statistically difference by gender ( $p < .05$ ) (Table 3). Hadjimbei et al. (2016) found that female students consumed more vegetables and olive oil than the males, whereas male students consumed more fruit and fruit juice and fish than the females. Another study by Bibiloni et al. (2016) found that vegetables and olive oil were consumed more by females than males while daily fruit and fruit juice consumption and fish were more by males than females.

## CONCLUSION

Adolescence is an important time for developing well-balanced eating habits. Nutrition information for eating right needs to be provided during this period. Healthy eating habits in adolescence positively affect health in adult life. By increasing their KIDMED index and getting better nutrition, adolescents can improve their quality of life. This and other studies indicate that the KIDMED index is a useful scale for studies about healthy eating. MedDiet is effective in providing a healthy life. It is important that governmental policies encourage people to follow this diet to prevent future health problems.

## RECOMMENDATIONS

Families need to offer to their children healthy food choices for adequate and well-balanced nutrition. They have to prevent their children, as much as possible, from eating fast food. To ensure this, health policies need to be taken into consideration to raise awareness about MedDiet. Public health strategies should be planned and applied on adolescents for healthy diet. As a result, adherence to the pattern of MedDiet is decreasing the burden of chronic diseases and increasing healthy life. MedDiet should be added to school curriculum to raise awareness about adoption of this dietary technique.

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