

# Evaluation of adherence to Mediterranean diet in medical students at Kocaeli University, Turkey

Journal of International Medical Research  
2018, Vol. 46(4) 1585–1594  
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DOI: 10.1177/0300060518757158  
[journals.sagepub.com/home/imr](http://journals.sagepub.com/home/imr)



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## Abstract

**Introduction:** This study was conducted to evaluate the eating habits of medical students at Kocaeli University in northwest Turkey in terms of their ability to apply their academic knowledge regarding healthy lifestyles to their own lives using the Mediterranean Diet Quality Index (KIDMED).

**Methods:** In this cross-sectional study, a questionnaire including demographic information and the KIDMED index was administered to 354 medical school students (206 first-year and 148 third-year students). The students' sex, body mass index, KIDMED score, place of residence, smoking habit, media screen time, and regular exercising variables were evaluated.

**Results:** The KIDMED score was  $-2$  to  $8$  ( $3.8 \pm 1.9$ ) among all students,  $-1$  to  $8$  ( $3.9 \pm 2.0$ ) among first-year students, and  $-1$  to  $8$  ( $3.6 \pm 1.9$ ) among third-year students. In total, 59.1% of females and 40.9% of males among first-year students showed moderate adherence to the Mediterranean diet, and female students showed better adherence to the Mediterranean diet than males among third-year students.

**Conclusion:** Medical students at Kocaeli University in Turkey showed inadequate application of their academic knowledge about healthy living to their own lives.

## Keywords

Lifestyle behaviors, medical students, Mediterranean diet, Mediterranean Diet Quality Index, body mass index, adherence

Date received: 27 September 2017; accepted: 11 January 2018

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## Introduction

Human health is closely associated with nutrition. Many epidemiological and nutritional studies have identified a relationship between eating habits and disease.<sup>1-3</sup> Daily food intake is a risk factor for chronic disease.<sup>1-3</sup> In addition to patients' demographic characteristics, eating habits are a risk factor for heart disease, hyperlipidemia, hypertension, obesity, insulin resistance, paralysis, and cancer.<sup>1-3</sup>

The Mediterranean diet (MD), which is named after the geographical region, became popular in the second half of the 20th century. The MD is accepted as a healthy eating style worldwide, and has been recommended in many publications as a lifestyle factor necessary for a healthy life.<sup>2</sup>

Many methods have been developed to evaluate eating habits. The first study to point out the relationship between diet and lifestyle was conducted in 1953 by Allbaugh,<sup>4</sup> who examined people's eating habits and lifestyles. The Mediterranean Diet Quality Index is one tool with which to evaluate eating habits. After establishment of the MD, the diet did not remain limited to the Mediterranean region and was accepted worldwide. In 1995, Keys<sup>5</sup> stated that a relationship exists between chronic disease and diet.

The MD has also been shown to reduce the incidence rate of cardiovascular disease, metabolic syndrome, mortality, and morbidity.<sup>6</sup> Trichopoulou and Lagiou<sup>7</sup> and Trichopoulou et al.<sup>8</sup> developed the Mediterranean Dietary Score as a nutrition score for adults in accordance with the MD. One tool that was developed to measure diet quality, evaluate eating habits, and regularly follow up diet quality is the Mediterranean Diet Quality Index (KIDMED), which was developed by Serra-Majem et al.<sup>9,10</sup> and is applied to children, adolescents, and young adults aged 2 to 24 years.

Children and adolescents develop new lifestyle habits as age progresses. As their moods change and they experience various impacts from their environment and families, they develop different lifestyles and eating habits that often persist into the future.<sup>11</sup> Poor nutrition may lead to malnutrition, excess overweight, or obesity. The university years are a time when adolescents often change their diets. During this time, they experience the responsibility of decision-making related to lifestyle and personal decisions such as where and what to eat; whether to consume alcohol, smoke cigarettes or use drugs; what social groups to join; and when and from where to get medical help. Because of factors such as being away from home, experiencing a busy university life, having inadequate time to eat, and joining new groups of friends, adolescents often develop eating habits that negatively affect their health.<sup>12</sup>

Besides their medical curriculum, medical students acquire knowledge regarding staying healthy and eating well. With this medical training, they are expected to recommend suitable eating habits to their future patients to maintain a sufficiently healthy life. While providing knowledge regarding eating habits to their future patients, they are also expected to adjust their habits in accordance with this knowledge.<sup>13,14</sup> It is rather important for medical students to try to adopt healthy lifestyles during their period of study. Thus, they are expected to have healthy diets. The MD is expected to be among their diet options.

In this study, we examined the adequacy of the medical education of students at Kocaeli University, located in northwest Turkey, with respect to adopting a healthy diet by evaluating the students' eating habits in terms of their ability apply their academic knowledge of healthy lifestyles to their own lives using the KIDMED.

## Materials and methods

### KIDMED

Olive oil is a primary food source in the MD, which was developed based on the eating habits in the Mediterranean region. In addition to olive oil, the MD is characterized by legumes, egg, poultry, dairy products, cheese, yogurt, frequent consumption of fish and sea products, moderate consumption of wine, and relatively low consumption of red meat. These are fresh products consumed seasonally, and they are consumed without processing. The most important factor is that these products have antioxidant properties.

The KIDMED was developed by Serra-Majem et al.<sup>9,10</sup> to evaluate adherence to the MD in children, adolescents, and young adults aged 2 to 24 years. The index is composed of 16 “yes” or “no” questions. Each answer indicates positive or negative adherence to the MD by a score of +1 or -1, respectively. A score of 12 indicates the highest commitment to the MD. The sum of the values obtained from the KIDMED are categorized into three groups:  $\geq 8$  indicates good adherence (*good*), 4 to 7 indicates moderate adherence (*average*), and  $\leq 3$  indicates very low adherence (*poor*) to the MD.

### Questionnaire

This cross-sectional study involved the first- and third-year students of the School of Medicine of Kocaeli University, located in northwest Turkey, in September 2016. Both the first- and third-year students completed the questionnaire on the same day. All questions were close-ended and presented to the students in a face-to-face fashion in a time period of approximately 10 to 12 minutes during class. All students voluntarily participated in the study. The questions were divided into two sections: demographic information and the KIDMED index.

The first section of the questionnaire contained items regarding age, sex (male/female), height, weight, place of residence (with parent, dormitory, private hostel, rented house), year in university, smoking habit, television (TV) viewing/computer use time ( $<1$  or  $\geq 1$  h) (media screen time in h/day), and regular exercise. The body mass index (BMI) ( $\text{kg}/\text{m}^2$ ) was calculated according to the standardized protocol using height and weight. The participants were divided into two groups according to their BMI:  $<25$  and  $\geq 25$   $\text{kg}/\text{m}^2$ . The KIDMED index was applied in the second section of the questionnaire.

### Statistical analysis

All statistical analyses were performed using IBM SPSS for Windows version 20.0 (IBM Corp., Armonk, NY, USA). The Kolmogorov–Smirnov test was used to assess the normality of data distributions. Continuous variables are expressed as mean  $\pm$  standard deviation, and categorical variables are expressed as count (percentage). Continuous variables were compared between the groups using the Mann–Whitney U test, Kruskal–Wallis one-way analysis of variance, and Dunn’s post-hoc test. Categorical variables were compared between the groups using the Pearson and Monte Carlo chi square test. Chi-square analysis is inadequate for comparison of more than two categorical variables. Log-linear analysis was used to compare categorical variables and reveal interactions between variables. To determine the students’ KIDMED index, a general log-linear analysis was used for class, sex, BMI, and current residence. All saturated models were constructed for all possible interactions between the variables in a log linear analysis. A two-sided p value of  $<0.05$  was considered statistically significant.

Verbal informed consent was obtained from all participants in the first part of the questionnaire. This study was conducted according to the guidelines stated in the Declaration of Helsinki (World Medical Association). The study protocol was approved by the Kocaeli University Medical Institutional Review Board.

## Results

This study involved 354 first-year students (93 [45%] male, 113 [55%] female) and third-year students (66 [45%] male, 82 [55%] female). In total, 206 of the 312 first-year students completed the questionnaire (non-response rate, 34%), and 148 of the 290 third-year students completed the questionnaire (non-response rate, 49%).

The demographic characteristics of the students are shown in Table 1. The mean age, BMI, and KIDMED score of the female and male students was  $19.57 \pm 1.65$  and  $20.01 \pm 1.84$  years ( $p = 0.025$ ),  $20.9 \pm 2.8$  and  $23.1 \pm 2.8$  kg/m<sup>2</sup> ( $p < 0.001$ ), and  $4.0 \pm 1.9$  and  $3.6 \pm 2.0$  points ( $p = 0.037$ ), respectively. A total of 151 (42.7%) students had a *poor* KIDMED score, 195 (55.1%) had an *average* score, and 8 (2.3%) had a *good* score. More male than female students had a *poor* score (36.9% vs. 49.7%, respectively), more female than male students had

an *average* score (61.0% vs. 47.8%, respectively), and a similar number of female and male students had a *good* score (2.1% vs. 2.5%, respectively). The distribution of the KIDMED score categories was significantly different between male and female students ( $p = 0.047$ ).

The frequency of a “yes” answer for each question of the KIDMED is displayed in Table 2. A statistically significant difference was found in “Consumes nuts regularly (at least 2–3 times per week),” “Uses olive oil at home,” and “Has commercially baked goods or pastries for breakfast” between the first- and third-year students’ dietary habits.

Table 3 shows the anthropometric measurements and KIDMED index scores of the first- and third-year students. Of the 206 first-year students, 93 (45%) were male and 113 (55%) were female. Of the 148 third-year students, 66 (45%) were male and 82 (55%) were female. The age range was 17 to 28 years ( $19.77 \pm 1.75$  years) among all students, 17 to 24 years ( $18.85 \pm 1.32$  years) among first-year students, and 19 to 28 years ( $21.04 \pm 1.44$  years) among third-year students ( $p = 0.025$ ). The BMI range was 16.3 to 34.0 kg/m<sup>2</sup> ( $21.9 \pm 3.0$  kg/m<sup>2</sup>) among all students, 16.3 to 32.9 kg/m<sup>2</sup> ( $21.7 \pm 3.0$  kg/m<sup>2</sup>) among first-year students, and 16.3 to 34 kg/m<sup>2</sup> ( $22.1 \pm 3.0$  kg/m<sup>2</sup>) among third-year students. The KIDMED

**Table 1.** Demographic and anthropometric characteristics of the students by sex

	Female (n = 195)	Male (n = 159)	Total (n = 354)	p
Age (years)	$19.57 \pm 1.65$	$20.01 \pm 1.84$	$19.77 \pm 1.75$	0.025
Height (cm)	$165.46 \pm 6.38$	$177.60 \pm 6.37$	$170.92 \pm 8.78$	<0.001
Weight (kg)	$57.18 \pm 0.28$	$72.84 \pm 10.13$	$64.21 \pm 12.02$	<0.001
BMI (kg/m <sup>2</sup> )	$20.9 \pm 2.8$	$23.1 \pm 2.8$	$21.9 \pm 3.0$	<0.001
KIDMED	$4.0 \pm 1.9$	$3.6 \pm 2.0$	$3.8 \pm 1.9$	0.037
KIDMED scores				
Poor	72 (36.9)	79 (49.7)	151 (42.7)	0.047 <sup>MC</sup>
Average	119 (61.0)	76 (47.8)	195 (55.1)	
Good	4 (2.1)	4 (2.5)	8 (2.3)	

Data are presented as n (%) or mean  $\pm$  standard deviation.

BMI: body mass index, KIDMED: Mediterranean Diet Quality Index, MC: Monte Carlo probability value (chi-square test).

**Table 2.** KIDMED scores of “yes” for each item among first- and third-year students

	First year (n = 206)	Third year (n = 148)	p
Has a fruit or fruit juice every day	135 (65.5)	91 (61.5)	0.434
Has a second fruit every day	67 (32.5)	35 (23.6)	0.069
Has fresh or cooked vegetables regularly once a day	134 (65.0)	91 (61.5)	0.492
Has fresh or cooked vegetables more than once a day	15 (7.3)	7 (4.7)	0.449
Consumes fish regularly (at least 2–3 times per week)	41 (19.9)	22 (14.9)	0.222
Goes more than once a week to a fast food (hamburger) restaurant	146 (70.9)	117 (79.1)	0.082
Likes pulses and eats them more than once a week	156 (75.7)	120 (81.1)	0.231
Consumes pasta or rice almost every day ( $\geq 5$ times per week)	143 (69.4)	99 (66.9)	0.614
Has cereals or grains (bread, etc.) for breakfast	122 (59.2)	84 (56.8)	0.643
Consumes nuts regularly (at least 2–3 times per week)	131 (63.6)	118 (79.7)	<b>0.001</b>
Uses olive oil at home	78 (37.9)	33 (22.3)	<b>0.002</b>
Skips breakfast	172 (83.5)	123 (83.1)	0.923
Has a dairy product for breakfast (yogurt, milk, etc.)	46 (22.3)	34 (23.0)	0.887
Has commercially baked goods or pastries for breakfast	106 (51.5)	56 (37.8)	<b>0.011</b>
Has two yogurts and/or some cheese (40 g) daily	42 (20.4)	26 (17.6)	0.506
Has sweets and candy several times every day	111 (53.9)	75 (50.7)	0.551

Data are presented as n (%).

score range was  $-2$  to  $8$  ( $3.8 \pm 1.9$ ) among all students,  $-1$  to  $8$  ( $3.9 \pm 2.0$ ) among first-year students, and  $-2$  to  $8$  ( $3.6 \pm 1.9$ ) among third-year students. While 37.4% of first-year students stayed with their families, 52.7% of third-year students lived in student housing. While 15.0% of first-year students smoked, 27.7% of third-year students smoked. In terms of media screen time, 41.3% of first-year students and 42.6% of third-year students spent  $>1$  h/day engaged in screen time.

Table 4 shows the distribution of various parameters by the KIDMED score range. The mean age in the *poor*, *average*, and *good* categories was  $19.87 \pm 1.83$ ,  $19.74 \pm 1.70$ , and  $18.50 \pm 0.76$  years, respectively, with no significant difference. The mean BMI in the *poor*, *average*, and *good* categories was  $22.2 \pm 3.2$ ,  $21.6 \pm 2.9$ , and  $21.3 \pm 3.5$  kg/m<sup>2</sup>, respectively, with no significant difference.

Finally, Table 5 shows the distribution of KIDMED scores in the first- and third-year students. A total of 59.1% of first-year female students and 40.9% of third-year

male students and 63.8% of third-year female students and 36.2% of third-year male students ( $p=0.030$ ) were in the *average* category. In both classes, female students had better adherence to the MD. A total of 87.0% of the first-year students with a BMI of  $<25$  kg/m<sup>2</sup> and 13.0% of the first-year students with a BMI of  $\geq 25$  kg/m<sup>2</sup> were in the *average* category. A total of 86.2% of third-year students with a BMI of  $<25$  kg/m<sup>2</sup> and 13.8% of third-year students with a BMI of  $\geq 25$  kg/m<sup>2</sup> were in the *average* category. No significant difference in the place of residence was found among the KIDMED score categories for both first- and third-year students. First-year students living in dormitories had better adherence to the MD, while third-year students showed lesser adherence. No significant difference in smoking was found among the KIDMED score categories for both the first- and third-year students. In total, 19.0% of first-year smokers were in the *poor* category, and this percentage increased to 31.3% of third-year smokers.

**Table 3.** Anthropometric measurements and KIDMED index scores of first- and third-year students

	First year (n = 206)	Third year (n = 148)	Total (n = 354)	p
Male sex	93 (45.1)	66 (44.6)	159 (44.9)	0.918
Age (years)	18.95 ± 1.32	21.04 ± 1.44	19.77 ± 1.75	<0.001
Height (cm)	171.25 ± 9.03	170.45 ± 8.44	170.92 ± 8.78	0.529
Weight (kg)	64.06 ± 11.92	64.43 ± 12.20	64.21 ± 12.02	0.900
BMI (kg/m <sup>2</sup> )	21.74 ± 3.03	22.05 ± 3.03	21.87 ± 3.03	0.312
BMI score				
<25	175 (85.0)	127 (85.8)	302 (85.3)	0.942
≥25	31 (15.0)	21 (14.2)	52 (14.7)	
KIDMED	3.9 ± 2.0	3.6 ± 1.9	3.8 ± 1.9	0.115
KIDMED score				
Poor	84 (40.8)	67 (45.3)	151 (42.7)	0.207 <sup>MC</sup>
Average	115 (55.8)	80 (54.1)	195 (55.1)	
Good	7 (3.4)	1 (0.7)	8 (2.3)	
Current residence				
With parents	29 (14.1)	25 (16.9)	54 (15.3)	<0.001 <sup>MC</sup>
Dormitory	77 (37.4)	31 (20.9)	108 (30.5)	
Private hostel	67 (32.5)	14 (9.5)	81 (22.9)	
Rented house	33 (16.0)	78 (52.7)	111 (31.4)	
Smoking				
Yes	31 (15.0)	41 (27.7)	72 (20.3)	0.004
No	175 (85.0)	107 (72.3)	282 (79.7)	
Media screen time				
≥1 h/day	85 (41.3)	63 (42.6)	148 (41.8)	0.806
<1 h/day	121 (58.7)	85 (57.4)	206 (58.2)	
Currently exercise				
Yes	45 (21.8)	27 (18.2)	72 (20.3)	0.406
No	161 (78.2)	121 (81.8)	282 (79.7)	

Data are presented as n (%) or mean ± standard deviation.

BMI: body mass index, KIDMED: Mediterranean Diet Quality Index, MC: Monte Carlo probability value (chi-square test).

**Table 4.** Sociodemographic characteristics of the students by KIDMED scores

	Poor	Average	Good	P
Age (years)	19.87 ± 1.83	19.74 ± 1.70	18.50 ± 0.76	0.062
Height (cm)	172.23 ± 8.88	169.87 ± 8.66	171.50 ± 7.25	0.059
Weight (kg)	66.35 ± 12.85	62.62 ± 11.10	62.88 ± 12.64	0.020 <sup>‡</sup>
BMI (kg/m <sup>2</sup> )	22.2 ± 3.2	21.6 ± 2.9	21.3 ± 3.5	0.140
KIDMED	1.9 ± 1.1	5.1 ± 1.0	8.0 ± 0.0	–

Data are presented as mean ± standard deviation.

BMI: body mass index, KIDMED: Mediterranean Diet Quality Index.

<sup>‡</sup>Significant differences between poor and average KIDMED scores.

The number of smokers in the *poor* category increased in the third year. First-year students with an *average* KIDMED score had a 52.2% rate of spending <1 h/day

on the TV or computer. Third-year students with a *poor* KIDMED score had a 59.7% rate of spending <1 h/day on the TV or computer. First-year students with an

**Table 5.** Sociodemographic characteristics of the students according to class and KIDMED score

	First year			p	Third year			p
	Poor	Average	Good		Poor	Average	Good	
Male sex	42 (50.0)	68 (59.1)	3 (42.9)	0.404 <sup>MC</sup>	30 (44.8)	51 (63.8)	1 (100.0)	0.030 <sup>MC</sup>
BMI								
<25 kg/m <sup>2</sup>	69 (82.1)	100 (87.0)	6 (85.7)	0.764 <sup>MC</sup>	57 (85.1)	69 (86.2)	1 (100.0)	1.000 <sup>MC</sup>
≥25 kg/m <sup>2</sup>	15 (17.9)	15 (13.0)	1 (14.3)		10 (14.9)	11 (13.8)	0 (0.0)	
Current residence								
With parents	15 (17.9)	13 (11.3)	1 (14.3)		8 (11.9)	16 (20.0)	1 (100.0)	
Dormitory	30 (35.7)	44 (38.3)	3 (42.9)	0.771 <sup>MC</sup>	16 (23.9)	15 (18.8)	0 (0.0)	0.099 <sup>MC</sup>
Private hostel	29 (34.5)	36 (31.3)	2 (28.6)		3 (4.5)	11 (13.8)	0 (0.0)	
Rented house	10 (11.9)	22 (19.1)	1 (14.3)		40 (59.7)	38 (47.5)	0 (0.0)	
Smoking								
Yes	16 (19.0)	13 (11.3)	2 (28.6)	0.185 <sup>MC</sup>	21 (31.3)	20 (25.0)	0 (0.0)	0.609 <sup>MC</sup>
No	68 (81.0)	102 (88.7)	5 (71.4)		46 (68.7)	60 (75.0)	1 (100.0)	
Media screen time								
≥1 h/day	28 (33.3)	55 (47.8)	2 (28.6)	0.106 <sup>MC</sup>	27 (40.3)	36 (45.0)	0 (0.0)	0.782 <sup>MC</sup>
<1 h/day	56 (66.7)	60 (52.2)	5 (71.4)		40 (59.7)	44 (55.0)	1 (100.0)	
Currently exercise								
Yes	19 (22.6)	23 (20.0)	3 (42.9)	0.394 <sup>MC</sup>	11 (16.4)	15 (18.8)	1 (100.0)	0.175 <sup>MC</sup>
No	65 (77.4)	92 (80.0)	4 (57.1)		56 (83.6)	65 (81.2)	0 (0.0)	

Data are presented as n (%) or mean ± standard deviation. BMI: body mass index, MC: Monte Carlo probability value (chi-square test).

average KIDMED score had a 20.0% rate of performing regular exercise, while third-year students with an average KIDMED score had an 18.8% rate of performing regular exercise. (Table 5).

The general log-linear analysis revealed statistically significant relationships among the KIDMED scores of students who lived with their families (*poor vs. good*:  $z = -3.373$ ,  $p = 0.001$  and *average vs. good*:  $z = -4.095$ ,  $p < 0.001$ ). Statistically significant relationships were also found among the KIDMED scores of students who lived in dormitories (*average vs. poor*:  $z = -2.919$ ,  $p = 0.004$  and *average vs. good*:  $z = -3.872$ ,  $p < 0.001$ ).

### Discussion

An unhealthy diet is the main cause of chronic disease.<sup>15</sup> Medical students are highly educated in health and disease.

The primary focus of this study was a healthy diet as a component of overall health. We introduced the KIDMED to first- and third-year medical students to evaluate their eating habits with regard to a healthy lifestyle.

Students participating in the study had a BMI of <25 kg/m<sup>2</sup> (20.9 ± 2.8 kg/m<sup>2</sup> among female students, 23.1 ± 2.8 kg/m<sup>2</sup> among male students). In Murcia, Spain, Navarro-González et al.<sup>12</sup> found a mean BMI of 22.5 ± 3.3 kg/m<sup>2</sup> among females and 24.4 ± 2.7 kg/m<sup>2</sup> among males. In Cyprus, Hadjimbei et al.<sup>16</sup> found a mean BMI of 21.9 ± 3.7 kg/m<sup>2</sup> among females and 25.1 ± 3.7 kg/m<sup>2</sup> among males. Again in Spain, Pérez-Gallardo et al.<sup>17</sup> found a mean BMI of 22.5 ± 3.2 kg/m<sup>2</sup> among females and 24.8 ± 3.6 kg/m<sup>2</sup> among males. In Greece, Chourdakis et al.<sup>18</sup> found a mean BMI of 21.5 ± 2.7 kg/m<sup>2</sup> among females and 24.5 ± 3.5 kg/m<sup>2</sup>

among males. In the present study, first-year students had a mean BMI of  $22.5 \pm 3.2 \text{ kg/m}^2$  and third-year students had a mean BMI of  $22.1 \pm 3.0 \text{ kg/m}^2$ . First- and third-year students with a BMI of  $<25 \text{ kg/m}^2$  were found to be in the *average* category in terms of adherence to the MD. First- and third-year students with a BMI of  $\geq 25 \text{ kg/m}^2$  were found to be in the *poor* category in terms of adherence to the MD. The students participating in our study had BMI values similar to those in many studies conducted in other Mediterranean countries. When the students' eating habits were analyzed, their adherence to the MD suggested a low rate of a healthy diet.

In the present study, the mean KIDMED score was  $4.0 \pm 1.9$  among female students and  $3.6 \pm 2.0$  among male students. Fiore et al.<sup>19</sup> reported a mean KIDMED score of  $5.7 \pm 2.4$  among females and  $5.2 \pm 2.6$  among males. Among university students, female students were found to have better adherence to the MD than male students.

In terms of the place of residence, first-year students tended to live in dormitories (37.4%) while third-year students lived in rented homes. El-Kassas and Ziade.<sup>20</sup> observed that most students (92.4%) lived together with their families. Those who lived in dormitories showed less adherence to the MD than those who lived in student housing. Pelletier et al.<sup>21</sup> found that students living campus life did not have a healthy diet, did not undertake personal responsibilities, and ingested unhealthy foods. They also stated that campus life caused the students to eat unhealthy foods.

Cigarettes are widely consumed in Turkey. Approximately 20% of the university students participating in our study smoked. The percentage of smokers was 24% in the study by Hadjimbei et al.<sup>16</sup> and 11.7% in the study by El-Kassas and Ziade.<sup>20</sup> Muñoz et al.<sup>22</sup> found smoking percentages of 31.5% and 16.6% among females and males, respectively. In the

present study, 19% of first-year medical students and 31.3% of third-year medical students were in the *poor* KIDMED category. Third-year students had a higher rate of smoking than first-year students. Similar studies have shown that students who smoke have lower adherence to the MD than do nonsmoking students.<sup>16</sup> It can be said that because of the appetite-suppressant effect of cigarettes, smokers do not receive adequate health care and therefore do not place enough importance on their nutrition.

Physical activity has an enhancing impact on life expectancy throughout a person's lifetime.<sup>23</sup> In the present study, first- and third-year students who did not exercise regularly had *average* KIDMED scores (0.80% and 81.2%, respectively). El-Kassas and Ziade<sup>20</sup> reported a 60% rate for both sexes in their study. In our study, 42% of the students had  $>1$  h/day of media screen time. First- and third-year medical students had similar rates of media screen time, and both were in the *average* KIDMED category. Considering their busy academic life, medical students can be assumed to have a low rate of  $<1$  h/day of screen time. Apart from academic purposes, they were observed to have a low rate of using a TV or personal computer for entertainment purposes. The students in our study were observed to have a rather sedative lifestyle. Grao-Cruces et al.<sup>24,25</sup> and Rodríguez García et al.<sup>26</sup> found that physical activity was positively associated with the MD in Spanish adolescents and negatively associated with smoking in boys; additionally, individuals of both sexes who spent more time using a TV and personal computer were less adherent to the MD and consumed significantly more alcohol. Ferron et al.<sup>27</sup> reported differences between nonathletic and athletic adolescents: the latter had fewer somatic complaints, more confidence in their future health, a better body image, a lower



tendency to attempt suicide, a higher frequency of using a car seat belt, and a lower use of tobacco, wine, and marijuana. These results indicate that smoking, not exercising regularly, and engaging in a low level of physical activity lead to poor nutrition and abandonment of self-care among students, eventually causing obesity and chronic disease at advanced ages.<sup>28</sup>

This study has several limitations. It was designed as a cross-sectional study, and participation was low because of the voluntary nature of enrollment. The surveys were conducted in only one university in Turkey. Therefore, the results are not representative of all of Turkey. In addition, our findings are based on self-reported and qualitative data regarding the respondents' dietary habits, and the participants were not asked to report whether their food choices were related to their health status.

In conclusion, undergraduates at the School of Medicine of Kocaeli University were found to adequately apply their academic knowledge into their lives. However, they were also found to pay inadequate attention to self-care and have an unhealthy diet. The most significant finding of this study is that the students had low adherence to the MD, which is considered a healthy diet in scientific studies. Such individuals have a high risk of developing obesity and chronic disease in the future unless they change their lifestyle.

### Declaration of conflicting interests

The authors declare that there is no conflict of interest.

### Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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