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Original Article

Factors affecting diet quality in adolescents: the effect of sociodemographic characteristics and meal consumption

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Abstract

Background: Determining the quality of diet in individuals and having a good understanding of the factors affecting it would be essential in understanding the means to improve diet quality. *Objectives:* This study aimed to determine the diet quality and the factors affecting the diet quality of middle adolescents using the Mediterranean Diet Quality Index (KIDMED). *Methods:* In total, 550 adolescents aged 14–18 years participated in the study. Individuals who voluntarily participated completed the KIDMED scale and a questionnaire that investigated the demographic and general characteristics, eating habits, and anthropometric measurements. Of the participants, 57.5% were girls and 42.5% were boys. The mean KIDMED score of the participants was 5.12 ± 2.40. A model was created based on age, sex, number of main meals and snacks, BMI, income level, and education level of the parents, which were considered to have an effect on KIDMED. Increase in the BMI increased the KIDMED score by 0.057 units; additionally, the score increased in women by 0.550 units, in individuals with an income that was higher than their expenses by 1.245 units, in cases when the participant's mother had a graduate-level education by 1.541 units, and in cases when the participant's father had a high school diploma level education by 0.621 units. In total, 75.2% of the KIDMED score was explained through these variables. *Results:* According to the study data, diet quality of the adolescents was at a medium level, and diet quality was affected by the family income, parental education level, gender, number of meals, and BMI. *Conclusions:* These results show the need for intervention programs that consider the general and sociodemographic characteristics of the individuals and their families, as well as other factors such as healthy eating habits and body weight.

Keywords: Adolescent, Mediterranean diet, diet quality, KIDMED

Introduction

Nutrition plays a key role in protecting and improving the health of individuals. An adequate and balanced diet reduces the risk of developing chronic diseases while extending the lifespan in a qualified way. However, an inadequate and unbalanced diet with low dietary quality increases the risk of developing chronic diseases such as obesity, hypertension, and diabetes (1,2). For this reason, the nutritional status and diet quality of the individuals should be examined thoroughly, and the associated problems should be eliminated. In this context, nutrition studies associated with the presence of diseases are often referenced (3-5). Examination of the interaction between diet quality and health has the potential to shed light on this issue (5).

Physiological and psychological changes observed in this period also affect and change the physiological requirements and food choices of the adolescents. In addition, life-long eating habits of individuals are established during adolescence. In particular, the increase in energy, protein, vitamin, and mineral requirements should be met with an adequate and balanced diet. Absence of adequate and balanced nutrition during childhood and adolescence results in the decrease and possible cessation in the overall growth and development (6). Moreover, this deficiency may increase the risk of developing important chronic diseases during adulthood and old age. Nutritional disorders and poor eating habits such as skipping meals, undereating, or overeating, which would reduce diet quality, are more common among adolescents (7,8). In a study conducted with 1139 students aged 14–19 years, it was observed that the students had unhealthy dietary habits, including consumption of fewer vegetables, fruits, and dairy products, and that their fat and sodium intake was high. Reportedly, students frequently skipped meals and their meal profiles were associated with diet quality (9).

There has been an increasing trend of skipping meals, particularly the breakfast, among children and adolescents. According to the data from five studies, skipping breakfast results in poor diet quality (10-14). Skipping breakfast has been associated with increased weight and obesity. According to a systematic review by Monzani et al. (15), skipping breakfast was found to be an important marker that increased the risk of being overweight and obesity and that of developing metabolic diseases.

In addition to skipping meals, certain factors such as age, sex, parental education level, and socioeconomic level can also affect nutritional status in adolescents. In their study with 2084 adolescents, Assefa et al. (16) reported that household income level and employment status were positively correlated with the height for age Z-score in male participants. Additionally, in a study with 2236 children, Soekatri et al. (17) observed that parental education level and socioeconomic status were strongly correlated with childhood morbidity and malnutrition.

Determining the diet quality and having a good understanding of the factors affecting it would also shed light on the methods to improve of diet quality. Although there are studies that have attempted to determine the nutritional status and the factors affecting it, studies that have attempted to to determine diet quality and the factors affecting diet quality are relatively few in number. The current study aimed to determine the diet quality of middle adolescents living in Istanbul through the Mediterranean Diet Quality Index (KIDMED) and to determine the factors affecting their diet quality.

Methodology

Participants and procedure

According to TURKSTAT 2017 data, the study population consisted of 1,105,552 adolescents aged 14–18 years living in Istanbul. The sample of the study was calculated by performing power analysis with the Raosoft Sample Size Calculator. Accordingly, the sample size was determined as 385 individuals with 95% power and 5% margin of error, and the study was completed with 550 individuals.

In this cross-sectional-descriptive study, written consent for participation was obtained from the participants and their parents and the study was performed in accordance with the principles of the Helsinki Declaration. Ethics Committee Approval for this study was obtained from the Health Sciences Research

Ethics Committee with the decision numbered 14 and dated 08/21/2019.

Measurement tools

Voluntary participants filled the KIDMED scale with a "questionnaire form" with questions regarding the demographic and general characteristics, nutritional habits, and anthropometric measurements (height and body weight).

KIDMED, one of the scales used, is an easy and valid method. KIDMED, developed by Serra-Majem et al. (18), is an index with 16 questions related to the characteristics of the Mediterranean diet. Twelve questions have positive perspectives towards healthy eating (questions 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 13, and 15), and 4 of them included those having negative perspectives (questions 6, 12, 14, and 16). KIDMED scores resulted between 0 and 12. Optimal diet quality was considered in individuals with a score of ≥8 points, medium diet quality (need improvements in diet) with a score of 4–7 points, and poor diet quality with a score of ≤3 points.

Statistical analysis

Normality of continuous variables was checked using the Shapiro–Wilk test. Nonparametric tests were used as the variables did not conform to normal distribution. The Mann–Whitney U test was performed for the comparison based on two independent groups, and the Spearman's Rho coefficient was calculated for the examination of the relationship between two continuous variables. A multiple linear regression model was created to observe the effects of other variables on the Yale score. Alternatively, the Chi-Square test was used in the analysis of the categorical data. Data analysis was performed in SPSS 21 software. Statistical significance was considered at P = 0.05.

Results

In total, 550 adolescents participated in the study, 57.5% of which were girls and 42.5% were boys, with a mean age of 15.93 ± 1.39 years (Table 1). The mean KIDMED score of the participants was 5.12 ± 2.40, and the mean scores of the girls (5.67 ± 2.72, 95% CI: 5.37–5.97) were significantly higher than the mean scores of the boys (4.37 ± 1.62, 95% CI: 4.16–4.58) (P<0.001) (Table 2). Significant positive correlations were observed between the KIDMED scores of the participants and their BMI as well as number of main meals and snacks consumed by them (P < 0.05) (not shown in the table).

A model was created based on age, gender, number of main meals and snacks, BMI, income level, and the education level of the parents, which were considered to have an effect on KIDMED. Accordingly, the KIDMED score increased with age, according to the number of main meals and snacks, and increase in BMI; furthermore, it was also higher in women and in participants with an income higher than their expenditure, with a mother with a graduate level education, and a father with a primary school and high school diploma level education. Alternatively, the KIDMED scored showed a decreasing trend in cases when participants often skipped meals and when their mother had a primary, secondary, and high school diploma level education. Increase in the BMI increased the KIDMED score by 0.057 units; additionally, the score increased in women by 0.550 units, in individuals with an income that was higher than their expenses by 1.245 units, in cases when the participant's mother had a graduate-level education by 1.541 units, and in cases when the participant's father had a high school diploma level education by 0.621 units. In total, 75.2% of the KIDMED score was explained through these variables (Table 3).

Discussion

This study was conducted to evaluate the diet quality of middle adolescents using the KIDMED scale, to determine certain factors affecting diet quality and to elucidate the extent of their effects. The mean diet quality score of the students was 5.12 ± 2.40, which indicated medium level of diet quality. Mean scores of female students were higher than that of male students (P < 0.001). Although 32.2% students had poor diet quality, 53.1% had medium diet

Table 1. Sociodemographic and general characteristics of the participants

	MEAN (SD)	**Min-Max**
Age	15.93 (1.39)	14-18
Boy (N: 234)	15.82 (1.38)	14-18
Girl (N: 316)	16.01 (1.39)	14-18
	N= 550	**%**
Mother education		
Primary school graduate	74	13.5
Middle school graduate	76	13.8
High school graduate	104	18.9
Undergraduate	258	46.9
Postgraduate	38	6.9
Father education		
Primary school graduate	49	8.9
Middle school graduate	102	18.5
High school graduate	99	18.0
Undergraduate	207	37.6
Postgraduate	93	16.9
Perceived income		
Not enough	101	18.4
Just enough	287	51.3
More than needed	167	30.4
BMI Group (kg/m^2)		
Severe thinness (-2 SD)	65	11.8
Thinness (-1 SD)	96	17.5
Normal (Medyan)	209	38.0
Overweight (+1 SD)	104	18.9
Obesity (+2 SD)	76	13.8

SD: Standard deviation, BMI: Body mass index

quality, and 14.7% had good diet quality, the percentage of boys with poor diet quality and the percentage of girls with high diet quality were higher ($p < 0.001$). In another study conducted with 160 adolescents aged 11–16, poor diet quality was observed in 25%, medium diet quality in 56.6%, and high diet quality in 18.4% of the participants (19). In another study in which diet quality was determined using KIDMED, it was observed that 37.3% of the adolescents had poor diet quality and 53.6% of them needed to improve their diet quality (20). The number of adolescents with good diet quality was considerably low. Considering the effect of nutrition and diet quality on growth and development and on the susceptibility to diseases in adulthood, it was concluded that certain measures are required to improve diet quality. In this context, it is important to properly determine the factors affecting diet quality.

Table 2. Average and distributions of KIDMED scores and meal consumptions of the participants

	Girls (N:316)		**Boys (234)**		**Total (N: 550)**		**P**
	MEAN (SD)	**95% CI**	**MEAN (SD)**	**95% CI**	**MEAN (SD)**	**95% CI**	
KIDMED score	5.67 (2.72)	5.37- 5.97	4.37 (1.62)	4.16- 4.58	5.12 (2.40)	4.92- 5.32	**<0.001**[a]
BMI (kg/m^2)	22.04 (2.54)	21.76- 22.32	21.97 (2.73)	21.62- 22.32	22.01 (2.62)	21.79- 22.23	0.731
Main meals	2.54 (0.50)	2.48- 2.59	2.46 (0.50)	2.39- 2.52	2.50 (0.50)	2.46- 2.55	0.061[a]
Snacks	1.50 (0.76)	1.41-1.58	1.44 (0.61)	1.37-1.52	1.47 (0.70)	1.42- 1.53	0.409 [a]
	N	**%**	**N**	**%**	**N**	**%**	
KIDMED classification							
Poor diet quality	88	27.8	89	38.0	177	32.2	**<0.001***
Need improvements in diet	148	46.8	144	61.5	292	53.1	
Optimal diet quality	80	25.3	1	0.4	81	14.7	
Meal skipping							
Yes	247	78.2	189	80.8	436	79.3	0.456*
No	69	21.8	45	19.2	114	20.7	

*P: chi-square, a: Mann Whitney U

Skipping meals is one of the important factors for the decreased diet quality in adolescents. Skipping the breakfast particularly causes a further decrease in diet quality (21). A study previously reported that 25.6% of adolescents skipped meals and that the diet quality of those who skipped meals was lower (P > 0.05) (22). In a study conducted with 187 students aged 14–17 years, it was found that 55.5% of the students skipped meals and the most commonly skipped meal was breakfast. When the nutritional habits of adolescents were examined, it was observed that they generally consumed 3 or more meals (23). In this study, 79.3% of the students stated that they skipped meals, while it was observed that boys skipped more meals than girls (80.0% boys, 78.2% girls skipped meals), data not provided in the tables) (P > 0.05). Increase in the total number of main meals and snacks of the students subsequently increased their diet quality to a statistically significant degree (P < 0.05). Particularly, skipping meals decreased diet quality by 0.536 units, while an increase of 1 unit in the main meals increased diet quality by 0.526 units, and an increase of 1 unit in snacks by 0.597 units (P < 0.05). Considering that most students who skipped meals (80.2%) skipped the morning meal, it is believed that these students should be more careful about their meal frequency and habits, and they should be educated accordingly.

Although there are many studies showing that increased body mass index (BMI) and obesity, which has currently become an important health problem, are inversely related to diet quality, there are studies that have contradicted these results (21, 24-26). In this study, the majority of the students had a normal BMI, and a positive, weak relationship was observed with the KIDMED score. It is considered that these inconsistencies between the studies may be due to the characteristics of the populations examined in the studies, study protocols, diet assessment methods, and differences in the dietary index range.

Studies show that socioeconomic level and parental education influenced children's nutrition and diet quality (27-28). In a study conducted by Acar

Table 3. The effect of some variables on KIDMED score

	Unstandardized Coefficients		Standardized Coefficients	t	p
	B	**Std. Error**	**Beta**		
(Constant)	0.652	0.751		0.869	0.385
Age	0.099	0.038	0.057	2.574	**0.010**
Gender (girl)	0.550	0.109	0.113	5.033	**<0.001**
Perceived income (More than needed)	1.245	0.126	0.238	9.903	**<0.001**
Main meal	0.526	0.107	0.109	4.932	**<0.001**
Snack	0.597	0.089	0.174	6.731	**<0.001**
BMI	0.057	0.020	0.063	2.839	**0.005**
Meal skipping	-0.536	0.133	-0.090	-4.023	**<0.001**
Mother's education (primary school)	-3.102	0.225	-0.441	-13.799	**<0.001**
Mother's education (Middle school)	-2.778	0.175	-0.399	-15.889	**<0.001**
Mother's education (High school)	-1.526	0.195	-0.249	-7.825	**<0.001**
Mother's education (Graduate)	1.541	0.235	0.163	6.553	**<0.001**
Father's education (primary school)	0.503	0.245	0.060	2.055	**0.040**
Father's education (High school)	0.621	0.191	0.099	3.250	**0.001**

R^2:0.752 p<0.001
p: Multiple Linear Regression

Tek et al. (22), it was found that parental education level was associated with the diet quality of the children when adjusted according to age and gender (P < 0.05). In another study, maternal education level and family income were reportedly associated with optimal nutrition (29). In the present study, education level and income level were also found to be positively correlated with the diet quality of adolescents. An increase of one unit in the income level increased the diet quality by 1.245 units. Maternal education level being primary school decreased diet quality by –3.102 units, secondary school by –2.778 units, and high school by –1.526 units, while graduate education level increased it by 1.541 units. Regarding the education level of the father, only high school education level increased the diet quality by 0.621 units; however, there was no effect in cases of other education levels, which suggested that mothers were more influential in ensure optimal nutrition for the adolescents, and this effect can lead to a favorable result with the education level. This is considered to be due to the fact that mothers with a high level of education tend to search for more robust and evidence-based information and follow the recommendations of healthcare professionals better than

mothers with low levels of education, and robust and evidence-based nutritional knowledge can improve healthy eating habits and preferences (30).

Conclusion

Mediterranean diet should be encouraged in children and adolescents, starting from the parents. In order to correct unhealthy eating habits and increase diet quality, it is important to impart practical nutrition education to children and adolescents. Nutritional education also should target the whole family, especially the mother, to increase the diet quality of adolescents.

Limitations of the Study

Physical activity levels and the specific areas where the participants lived (rural-urban) were not investigated in the study. In addition, only middle adolescents were included in the study. The results can be improved with further studies that examine other associated factors with a more diverse group of adolescents and a higher sample size.

Conflict of interest: The authors declare that there is no conflict of interest regarding the publication of this paper.

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