Determination of the Relationship between Nutrition Habits, Social Physique Anxiety, and Physical Activity Levels of Adolescent Students

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ABSTRACT

Background: Concerns about physical appearance and other body characteristics are central to adolescents' sense of self-worth and have the potential to affect adolescents' nutrition habits and overall well-being.

Aim: This study was planned and conducted to determine the relationship between nutritional habits, social anxiety levels, and physical activity levels of students in the pubertal period. **Materials and Methods:** 300 students were enrolled in this descriptive cross-sectional study between the ages of 14-18 who lived in Ankara, between October 2017 and February 2018. The Mediterranean Diet Quality Index (KIDMED) was used to determine healthy eating habits, the International Physical Activity Form (IPAQ) to determine physical activity status, and the Social Physique Anxiety Inventory (SPAS) to determine social anxiety levels. **Results:** 232 girls and 68 boys participated in the study. There was no statistically significant difference between KIDMED, IPAQ, or SPAS by sex ($p > 0.05$). Students who stated that they eat a healthy diet had higher KIDMED scores and lower SPAS scores than those who had an unhealthy diet ($p<0.05$). Physical activity levels were similar in both groups ($p>0.05$). There was a positive correlation between KIDMED and IPAQ results, and negative correlations between KIDMED and SPAS and Body Mass Index for age ($p<0.05$). There was a negative but insignificant correlation between IPAQ and SPAS scores ($p>0.05$). **Conclusion:** Adherence to the Mediterranean diet and higher physical activity levels may protect adolescents from obesity, obesity-related comorbidities, and high social anxiety levels.

Key words: Healthy Eating, Mediterranean Diet, Adolescents, Physical Activity, Social Physique Anxiety

INTRODUCTION

Adolescence is a specific process in which physical and behavioral change is rapid. These include body weight, nutritional behaviors, and perception of body image, and these changes may significantly affect physical and mental health in the future.[1,2] An irregular meal consumption style, frequent snacking habits, a nutritional pattern consisting of ready and easily accessible foods, and nutritional behavior that is highly affected by environmental factors develop. Since adolescence is a period when individuals can make more autonomous decisions about their eating behaviors, the eating behavior problems that arise may frustrate efforts to sustain appropriate eating habits in the future.[3,4]

Considering that nearly 50% of body weight in adulthood is gained during adolescence, it can be thought that the realistic treatment of obesity, whose incidence is growing worldwide, should focus on this stage.[5,6] In this period, when the foundations of nutritional habits are set, individuals who cannot gain balanced and healthy habits will be at risk for many chronic diseases that will develop in the future. Besides, attention deficits, concentration disorders, perceptual and learning disability, decreased academic achievement, and various behavioral disorders can be observed in individuals with inadequate and unbalanced eating habits.[7,8]

The most common types of behaviors observed during adolescence include seeking identity, being independent, gaining acceptance, more interest in appearance, and desire to be strong and beautiful. Body image plays an important role especially in the psychosocial development of individuals in this period. The development of a negative body image during this period can lead to low self-esteem and, in turn, the development of unhealthy nutritional behaviors. For example, an individual who is dissatisfied with their body image may create a risk for their health both psychologically and physiologically by implementing a diet program where the nutritional requirements required for their growth and development are not met.[9,10] One study found that a negative body image was experienced in 35-81% of female adolescents and 16-55% of male adolescents, and this was especially prevalent in developed countries.[11] The results of the National Health Survey (PeNSE) in Brazil revealed that more than 38% of adolescents had negative body perception.[12] Similarly, in Turkey, 36.7% of individuals had gone on at least one diet to avoid getting fat.[13]

Alternative strategies are gaining importance in combating multiple problems of adolescence. Physical activity, which is one of them, is very important in adolescence due to its positive effects on the body and mental health.[14] In preventing obesity and similar problems,

physical activity habits are critical for the development of positive self-esteem, self-perception, and mental resilience.[15]

The present study was conducted to determine the relationship between nutritional habits, social physique anxiety levels, and physical activity levels in adolescent students.

MATERIALS AND METHODS

This cross-sectional, descriptive survey consisted of 300 students who were aged between 14 and 18 and who volunteered to participate in the study from two high schools in Ankara, Turkey. Data were collected by both researchers between October 2017 and February 2018 via face-to-face interviews using a questionnaire. The study was approved by Baskent University Medical and Health Sciences Research Board and Ethics Committee.

The questionnaire collected information about sociodemographic characteristics and eating habits. Weight and height measurements were taken and body mass index (BMI) was calculated for each student. The height measurement was done under the Frankfurt plane, with the back against a 90-degree vertical surface. The weight was measured using a 0.5 kg sensitive scale on an empty stomach in the morning, without shoes and with light clothes.[16] BMI Z scores were calculated according to age using the Anthro-Plus software of the World Health Organization (WHO) and categorized as : <-1 thin; between -1 and +1 normal; between +1 and +2 overweight; and > +2 obese.[17]

The Mediterranean Diet Quality Index (KIDMED) was developed by Serra-Majem et al.[18] It is used to evaluate the healthy nutritional status of adolescents and consists of a total of 16 questions, 12 of which relate to foods that are appropriate and 4 foods not appropriate for the Mediterranean diet (the latter being inversely scored). Each positive item is assigned 1 point and each negative item is assigned -1 point, and the total score is obtained by summing the points of the 16 questions. According to the total score obtained, KIDMED scores are divided into 3 groups: scores of ≥8 are ranked as good (adherence to the Mediterranean diet), scores between 4 and 7 are ranked average (needs to be improved), and scores of ≤3 are ranked poor (incompatible with the Mediterranean diet).[18]

The International Physical Activity Questionnaire (IPAQ) was employed to determine the physical activity levels of the participants. This questionnaire was developed by Craig et al.[19] and its Turkish validity and reliability were confirmed by Sağlam et al.[20] While there are long and short IPAQ versions that can be applied to participants aged between 15 and 65, in the

present study the IPAQ-Short form was used. The short form (7 items) provides information about the time spent walking and doing moderate and vigorous activities and the time spent sitting. For calculating the total score, the duration (minutes) and frequency (the number of days) of walking and doing moderate and vigorous activities are multiplied by 1 MET (Metabolic Equivalent of Task)-minute, and then all subcategories are summed up. Scores <600 MET-min/week were evaluated as inactive, 600-3000 MET-min/week as minimally active, and >3000 MET-min/week as highly active.

To determine the social physique anxiety level, the Social Physique Anxiety Scale (SPAS) was employed. It was developed by Hart et al.[21] and its Turkish validity and reliability were confirmed by Ballı and Aşçı.[22] The scale consists of 12 items and has a 5-point Likert type rating system (ranging from 1=totally agree to 5 = totally disagree). Scores can range from 12 to 60, with increased scores interpreted as increased levels of anxiety felt by the person due to their appearance.

The data were evaluated on the SPSS 17.0 software package. Descriptive statistics were used to evaluate the nutritional habits and demographic characteristics. Categorical data were presented as numbers (n), percentages (%), while continuous variable data were presented as mean and standard deviation values. In the evaluation of gender-based BMI Z scores, physical activity, healthy nutrition, and social physique anxiety states, student t-test was used for parametric data and the Mann-Whitney U test was used for non-parametric data. Cross-tabulations of categorical variables were evaluated with the Chi-square test. The relationship between age-based BMI, KIDMED, IPAQ, and SPAS total scores was calculated using Pearson's correlation coefficient. The statistical significance level was chosen as 0.05.

RESULTS AND DISCUSSION

A total of 300 adolescents, including 232 (77.3%) females and 68 (22.7%) males, participated in the study. 81% tended to skip meals, with breakfast as the most frequently skipped meal (51.5%). 49.7% ate out one or more times a week and 55.3% thought that their diet was unhealthy. Table 1 presents some of the demographic characteristics of the participants and the evaluation of theirtypical nutritional habits, as reported to the researchers.

Table 2 gives the gender-based mean scores for the KIDMED, IPAQ, and SPAS and age-based BMI Z scores and group evaluations. The mean BMI score of the females was

Table 1. Demographic characteristics and typical nutritional habits of the sample

	n	%
Sex		
Girl	232	77.3
Boy	68	22.7
Age (x±sd)	16.01±0.95	
Meal frequency (x±sd)	2.14±0.77	
1	60	20
2	131	43.7
3	95	31.7
4	5	1.7
Snack frequency (x±sd)	1.44±1.06	
0	48	16.0
1	125	41.7
2	78	26.0
3	30	10.0
4	11	3.6
Skipped meal		
Yes	243	81.0
No	57	19.0
Most frequently skipped meal		
Breakfast	128	51.5
Lunch	45	18.6
Dinner	24	10.0
Snacks	46	19.9
Frequency of eating out		
Every day	31	10.3
2-3 times a week	50	16.7
Once a week	68	22.7
2-3 times a month	71	23.7
Once a month	54	18.0
None	26	8.7
Eating healthy		
Yes	134	44.7
No	166	55.3
BMI by age		
Under weight	42	14.0
Normal	164	54.7
Overweight	69	23.0
Obese	25	8.3
Chronic disease		
Yes	58	19.3
No	242	80.7

BMI: Body Mass Index

found to be lower than that of the males ($p < 0.05$). No statistically significant difference was found between genders in terms of KIDMED mean score (-0.24 ± 5.34) and its subgroups, IPAQ mean score (2277.16 ± 2589.86) and its subgroups, and SPAS mean score (35.08 ± 8.66) and its subgroups ($p > 0.05$).

Table 2. Evaluation of gender-based BMI Z scores, physical activity, healthy diet, and social physique anxiety status of the participants

	Girl (n=232)		Boy (n= 68)		Total (n= 300)		
	n	%	n	%	n	%	p
Age-based BMI Z scores (x±sd)	0.43±0.18		0.59±0.22		0.47±0.69		0.034[a]
Age-based BMI groups							
Underweight(<-1)	39	81.3	9	18.7	48	16.0	
Normal (-1 /+1)	154	81.5	35	18.5	189	63.0	
Overweight (+1 /+2)	32	64.0	18	36.0	50	16.7	0.010[b]
Obese (>+2)	7	53.8	6	46.2	13	4.3	
KIDMED (x±sd)	-0.41±5.29		0.54±5.88		-0.24±5.34		0.262[a]
KIDMED groups							
High (≥8)	18	72.0	7	28.0	25	8.3	
Average (4-7)	46	73.0	17	27.0	63	21.0	0.468[b]
Low (≤3)	168	79.2	44	20.8	212	70.7	
IPAQ (x±sd)	2095.51±230.22		2658.30±273.71		2277.16±2589.86		0.124[a]
IPAQ groups							
İnactive	64	80.0	16	20.0	80	26.7	
Min. active	106	77.4	31	22.6	137	45.7	0.721[b]
Max. active	62	74.7	21	25.3	83	27.7	
SPAS (x±sd)	35.14±8.41		34.86±9.54		35.08±8.66		0.454[c]

BMI: Body Mass Index; KIDMED: The Mediterranean Diet Quality Index; IPAQ: The International Physical Activity Questionnaire; SPAS: Social Physique Anxiety Scale
[a]Student t-test, [b]Pearson chi-square, [c]Mann-whitney u-test

Table 3 presents a comparison of the mean KIDMED, IPAQ, and SPAS scores of the adolescents according to whether or not they judged they have a healthy diet. The mean KIDMED scores of those who reported that they had a healthy diet was higher than those who thought that their diet was unhealthy ($p < 0.05$), and their mean SPAS scores were lower ($p < 0.05$). Physical activity level differences were not statistically significant ($p > 0.05$). As

Table 3. Comparison of the mean KIDMED, IPAQ, and SPAS scores of the adolescents who thought they had a healthy/unhealthy diet

	Thought they had a healthy diet (n=134)		Thought they had an unhealthy diet (n=166)		
	X	SD	X	SD	p
KIDMED	2,20	4,63	-2,13	5,26	0,000[b]
IPAQ	2445,90	244,51	2039,48	224,90	0,148[b]
SPAS	32,35	7,17	37,27	9,14	0,000[a]

KIDMED: The Mediterranean Diet Quality Index; IPAQ: The International Physical Activity Questionnaire; SPAS: Social Physique Anxiety Scale;
[a]Mann-whitney u-test, [b]student t-test

shown in Table 4, a positive correlation was found between KIDMED and IPAQ, and a negative correlation between KIDMED and both SPAS and BMI for age ($p < 0.01$).

Table 4. The relationship between healthy nutrition, physical activity, social physique anxiety indices, and age-based BMI Z scores in adolescents

	KIDMED	IPAQ	SPAS	Age-based BMI z scores
KIDMED	1	r= 0,224 p= 0,000	r= -0,210 p= 0,000	r= -0,149 p= 0,010
IPAQ		1	r= -0,083 p= 0,153	r= 0,010 p= 0,863
SPAS			1	r= 0,332 p= 0,000
Age-based BMI z scores				1

KIDMED: The Mediterranean Diet Quality Index; IPAQ: The International Physical Activity Questionnaire; SPAS: Social Physique Anxiety Scale; BMI: Body Mass Index

In this study, which was carried out to determine the relationship between the nutritional habits, social physique anxiety level, and physical activity levels of adolescents, 81% of the participants whose mean age was 16.01 ± 0.95 years were found to skip meals and the most frequently skipped meal was determined to be breakfast (51.5%). Skipping meals was more common especially in the mid and late adolescence. In one study,[23] levels of fiber, vitamin A, vitamin C, vitamin E, B6, B12, folic acid, iron, calcium, phosphorus, magnesium, and potassium were found to be lower among individuals who skipped breakfast compared to those who did not. In the same study, skipping breakfast was also reported to possibly affect concentration, learning, and school performance. In the present study, no correlation was found between skipping meals or skipping breakfast and BMI values. Studies have indicated that desire to sleep more, lack of time, lack of appetite, lack of food, and going on a diet were among reasons for skipping meals.[24,25] Similarly, in the present study, lack of appetite (41.5%) and lack of time (39.9%) were found to be the most common causes of skipping meals. 49.7% of the adolescents were determined to eat out once or more a week. Studies about eating out during adolescence have suggested that there is a relationship between the dining place, the pattern of healthy eating, and the total quality of the diet; in particular, as the frequency of eating out increased, there was a decrease in the consumption of fruit and vegetables and an increase in the consumption of ready-made foods poor in vitamins and fiber.[23-26]

Adolescence is a period in which the individual tries to create a balance between their personal and social identities. While trying to establish this balance, the adolescent develops ideas and perceptions related to their skills, talents, personality traits, and behavior styles as well as physical, emotional, social, academic traits. Physical appearance becomes especially important in this effort to evaluate themselves and generate meaning from this. Body perceptions then relate to identity development. In a study conducted on 2400 Turkish adolescents on this topic, the most important thing for 30.6% of them was physical appearance.[27] Body perception has a very important role among individuals, especially in determining what they may do in controlling their body weight. The importance given to body perception and related variables was observed to be higher in girls than in boys.[26,27] In the present study, while 16% were overweight, 23% considered themselves to be overweight, and while 4% were obese, 8% considered themselves to be obese.

Another factor in self-perception is physical activity. In addition to the positive effects of physical activity on physical health, its contribution to mental and social strengthening helps develop various skills and including communication skills, especially in adolescence. Several studies show that there is a strong relationship between the frequency of doing physical activity and factors such as social physique anxiety, self-perception, depressive symptoms, and self-confidence.[25-26] For example, a study conducted with female adolescents found a positive correlation between the frequency of doing physical exercise and self-confidence and body perception and a negative correlation between the frequency of doing physical exercise and body weight and self-confidence.[27] In the present study, the physical activity levels of adolescents were evaluated with IPAQ, and accordingly, the majority of the adolescents, 72%, were observed to be inactive or minimally active. The IPAQ values of males were non-significantly higher than females. Similar what can be found in the literature,[25-27] a negative correlation was found between physical activity and social physique anxiety in this study.

In a study conducted on 3190 children and adolescents in Spain, 51.1% of those aged between 10 and 16 were found to have a medium KIDMED score, while 2.0% were low.[28] In an Italian study of 1740 individuals with a mean age of 8.80 ± 0.0 years, only 5.0% had a high KIDMED index, 62.2% had medium and 32.8% had low.[29] In the present study, nearly 70.0% had a low KIDMED index, with the mean score of the males (0.54 ± 5.88) non-significantly higher than that of the females (-0.41 ± 5.29)Also, the mean KIDMED scores of the adolescents who reported that they had a healthy diet were higher than those who thought that they had an unhealthy diet. Besides, their social physique anxiety levels were lower ($p < 0.05$). Perhaps the

most remarkable findings of the study were a strong positive correlation between the KIDMED score and IPAQ score (r = 0.224, p = 0.000), a strong negative relationship between KIDMED and SPAS (r = -0.210, p = 0.000) and a significant negative correlation between KIDMED and BMI for age (r = -0.149, p = 0.010). This indicated that individuals who reported a higher compliance with the Mediterranean diet had higher levels of doing physical activity and lower levels of social physique anxiety and lower age-based BMI. The Mediterranean diet prototype is widely used as an educational tool in public health nutrition programs. Several studies have shown that following the Mediterranean diet pyramid (consumption of grains, fruits, and vegetables, legumes, olive oil, low-fat cheese, and yogurt daily, fish and eggs weekly, and meat monthly) has a positive effect on risks for, cardiovascular, metabolic and psychological health problems.[30] Moreover, a healthy eating pattern, such as Mediterranean diet, is considered to be fundamental in preventing and reducing obesity.[30] Although the data on adherence to the Mediterranean diet in children and adolescents are limited, adolescents with high compliance with the Mediterranean diet tend to be more physically active and therefore have lower social physique anxiety.[30]

In the present study, compliance with the Mediterranean diet was found to be quite low. Although the incidence of obesity among adolescents varies by country, it is increasing dramatically. Accordingly, while the prevalence of overweight is observed to vary between 9.3 and 37.5% and the prevalence of obesity ranged between 3 and 30% among adolescents worldwide, in studies conducted in our country, the prevalence of overweight and obesity was reported to range between 8.6 and 23.4% and between 2 and 15%, respectively.[31] When evaluated according to the WHO BMI for age Z scores, in the present study, 79.0% of the adolescents aged between 14 and 18 were found to be thin or normal, 16.0% overweight, and 5% obese. The mean BMI for age Z score of the males was higher than that of the females ($p < 0.05$). In this study, the BMI for age Z score was determined to decrease significantly as the compliance with the Mediterranean diet increased (p = 0.01). In the present study also, the level of social physique anxiety was found to significantly decrease as compliance with the Mediterranean diet increased (p = 0,000).

In conclusion, increasing the physical activity levels and adherence to the Mediterranean diet in adolescents may be very important in both preventing obesity and obesity-related comorbidities and decreasing social physique anxiety levels. Therefore, gaining accurate information about fruits, vegetables, whole grain products, and proper protein and fat sources

and encouraging physical activity programs outside school will increase the adaptation to both psychological and physiological changes of this period.

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