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Nutritional status, Healthy Eating Index and eating attitudes of the adolescents in Istanbul: a cross-sectional study

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Abstract

Background: The aim of this study was to evaluate dietary quality of adolescents by using the Healthy Eating Index (HEI) and to assess their eating attitudes by the EAT-26 Eating Attitude Test.
Methods: Eight schools; four primary schools and four secondary schools were randomly selected from the school list of official website of Istanbul Education National Directorate. Five hundred and ninety-eight students who met the inclusion criteria included in the study, 24 h dietary recalls were collected to calculate their HEI scores and eating attitudes were evaluated by EAT-26 Eating Attitude Test. Their weight, height and waist circumference were measured.
Results: According to HEI scores, only two (0.3%) of adolescents had high quality diet, 379 (63.4%) had diet quality that needed improvement and 217 (36.3%) had poor diet. Regarding Eating Attitude Test scores, 513 (85.8%) had normal attitudes regarding eating behaviors.
Conclusion: Almost all of the participants need either development or major changes in their eating behaviors. Interventions aiming high quality diet among adolescents are strongly recommended.

Keywords: adolescents; dietary patterns; eating disorders; Healthy Eating Index; nutritional status.

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Introduction

Turkey has a 24%–26% young (10–24 years) according to the UN World Population Prospects report (2008 revision) (1). Adolescence is one of the most challenging periods in human development. The relatively uniform growth of childhood is suddenly altered by a rapid increase in the growth rate. These sudden changes create special nutritional needs. Adolescents are considered especially vulnerable nutritionally for several reasons. First, they have an increased demand for nutrients because of the dramatic increase in physical growth and development. Second, the changes in lifestyle and food habits of adolescents affect nutrient intake and needs. Third, adolescents have special nutrient needs associated with participation in sports, pregnancy, development of an eating disorder, excessive dieting, use of alcohol and drugs, or other situations common to adolescents (2).

Nowadays, unhealthy eating attitudes and relating disorders are a global concern in both developed and developing countries. Prevalence of eating disorders continues to remain high in school age children and adolescents. Many adolescents demonstrate poor dietary practices while failing to meet current dietary guidelines and recommendations (3). The situation is the same in Turkey although there are few studies directly targeting diet quality of adolescent age group (4).

Existing studies show that diet quality of Turkish adolescents needs to be improved (4–6). The aim of this study is to evaluate eating attitudes and diet quality of adolescents by using EAT-26 Eating Attitude Test and Healthy Eating Index (HEI).

Materials and methods

Study population

A cross-sectional study was conducted among adolescents attending primary and secondary schools in Anatolian side of İstanbul. The list of primary and secondary schools were obtained from Istanbul

Provincial Education Directorate's website. The size of study sample that will represent the adolescents in these schools at a confidence level of 95% was estimated to be 384. Four primary schools and four secondary schools were randomly selected from the school lists. Then three classes, one from each of the 6th, 7th and 8th years of primary schools and another three classes, one from each of the ninth and tenth years of secondary schools were selected randomly. All students attending to the selected classes were included in the study sample if they met the inclusion criteria.

Subjects were chosen among adolescents without any illness requiring a diet restriction, on a voluntary basis. Trained interviewers from the Department of Dietetics and Medical School of Yeditepe University collected all data during face-to-face interviews, between April 2013 and April 2014 in the selected schools.

Pre-study period

All interviewers were trained for standardization of the data collection procedures and preventing the probable interviewer bias. They were informed about the aim of the study, the use of study instruments, application of the questionnaires and the details of the 24 h dietary recall method.

Measurements and data collection

Trained dietetics and medical students did all measurements. A portable scale (SECA, model: 869; Seca Medical Measuring Systems and Scales, Birmingham, UK) and a stadiometer were used to measure weight and height and body mass index (BMI) was calculated as weight (kg) divided by height squared (m^2). Weight has been measured with pants on in boys and skirts on in girls and also shirts on for both genders. Shoes and outer clothing were taken off during measurements. According to BMI percentiles (WHO/NCHS/CDC, 1983), the 95th percentile and above was considered as obese and 85th percentile and above was considered as overweight. Waist circumference (WC) was measured at the mid-point, above the iliac crest and below the lowest rib margin using a flexible tape.

A questionnaire was filled during face-to-face interviews before the anthropometric measurements. The questionnaire included questions about age, sex, presence of food allergies, systemic diseases, use of medications and physical activity status of the participants. Questions regarding the educational status, economic status and medical history of the participants' families were also included in the questionnaire.

Twenty-four hour dietary recall (24HR) method was used to assess the food consumption and score HEI and Nutrition Information System (BeBiS; BEBIS Pacific Electricity, Electronic and Environment Technology Products, Industry and Commerce Limited Co., Istanbul, Turkey) was used to calculate daily nutrient intakes recorded form 24HR.

HEI was designed to assess diet quality in people aged 2 years and older (7). The HEI score is the sum of individual scores for 10 components. The first five components measure the degree of compliance with the US Department of Agriculture Food Guide Pyramid recommendations for grains, vegetables, fruit, dairy and meat as recommended in servings per day. The next four components of the HEI assess the degree of adherence to Dietary Guidelines for Americans recommendations for daily intake of total fat, saturated fat, cholesterol, and sodium. The final component examines the variety of foods in the same groups.

Scores between 0 and 10 were assigned to all components. A score of 10 was assigned to all first five components if the recommended amount or more is consumed and a score of 0 was assigned when any kind of food in that group is not consumed. For next four components which observe total fat, saturated fat, cholesterol and sodium intake considers the maximum score 10 as the diet contains less amounts than maximum intake allowances, while the intakes increase, scores decrease proportionally and the score 0 is for the extreme amounts. The last components of the HEI is variety is scored according to the different kind of food in the same groups at the first five component; grains, vegetables, fruit, dairy and meat. For all components intermediate scores are calculated proportionally. The HEI score categorization proposed by Kennedy and colleagues (7) was initially used (an HEI score >80 implies a good diet, a score between 50 and 80 indicates a diet needs improvement, and a score lower than 50 indicates a poor diet). However, because only a few percent of participants had a score of >80, further analyses were performed using the quartile of the HEI score (8).

The Eating Attitude Test (EAT-26) is one of the most widely used standardized measures used to assess the disorder risk based on attitudes, feelings, and behaviors related to eating (9). Participants are asked to respond to each of 26 questions on a six-point scale which score, respectively, 3 (always), 2 (usually), 1 (often), 0 (never/rarely/sometimes), indicating how often they have the eating symptoms and concerns that are common in eating disorders. Total scores of EAT-26 can range from 0 to 78, with higher scores indicative of more severe disordered eating. A score at or above 30 indicates a high risk of eating disorder. In our study, reliable and valid Turkish version of EAT-26 was used (10).

Statistical analyses

SPSS version 18.0 is used for statistical analysis. Descriptive statistics were calculated and statistical analyses were conducted to determine the possible associations between participants' demographics, physical activity status and their eating patterns. A χ^2-test was used for the comparison of categorical variables and the Student's t-test or its nonparametric equivalent was used for the comparison of continuous variables. $p<0.05$ was accepted as significant.

Ethics

The study has been approved by Yeditepe University Ethical Committee. Also, official permission has been taken from İstanbul Provincial Education Directorate. After official permission, each school principal was contacted for oral permission and appointment for the data collection. Adolescents' parents signed an informed consent adhering to Declaration of Helsinki protocols (Word Medical Association) before conducting the study.

Results

Complete and reliable data were collected from 598 of 642 students with a participation rate of 93.1%. Some

demographic and health characteristics of the study group are presented in Table 1. As it is seen, 48.3% of the study group were female, 12.4% had a chronic health problem, 59.5% were engaged in regular sportive activities. The majority of the group 54.7% had normal BMI values, while 14.0% were overweight, 4.3% obese and 26.6% underweight.

According to healthy index, only two (0.3%) of adolescents had high quality diet, 379 (63.4%) had diet quality need to be developed and 217 (36.3%) had poor diet. HEI scores of participants by demographic and health characteristics are presented in Table 2. HEI scores were significantly higher among females than males (p=0.01), and among the students whose fathers are graduates of university (p=0.038).

Among 598 adolescents 85 (14.2%) of adolescents had eating attitude points >30 and 513 (85.8%) had normal attitude points (≤30) (Table 3). There was no difference between males' and females' eating attitudes scores. Percentage of adolescents with normal eating attitude scores (≤30) was significantly higher among 15–17 years age group than 12–14 years age group (92.8% vs. 80.9%, respectively; p<0.001). Percentage of adolescents with normal eating attitude values was significantly higher among the participants who declared no chronic health problem (p=0.009) and normal or underweight adolescents (p=0.015).

Males were more regularly exercising than females (72.4% vs. 45%, respectively; x^2=45.69, p<0.001). There was no gender difference regarding BMI, parental education, chronic health condition, owing house or car, any health condition restricting physical activity, going to school by walking.

Total scores of subcomponents of HEI has been shown in Table 4.

Table 1: Participants' characteristics.

	n, %
Age groups (n=598)	
11–14 years	347 (58.0)
15–17 years	251 (42.0)
Gender (n=598)	
Male	309 (51.7)
Female	289 (48.3)
Maternal education (n=586)	
Primary or secondary school	313 (53.4)
University	273 (46.7)
Paternal education (n=586)	
Primary or secondary school	250 (44.0)
University	336 (56.0)
Chronic health condition (n=590)	
Yes	74 (12.4)
No	516 (87.6)
Regular sportive activity (n=588)	
Yes	350 (59.5)
No	238 (40.5)
Body mass index (n=598)	
Underweight	159 (26.6)
Normal	327 (54.7)
Overweight	84 (14.0)
Obese	26 (4.3)
Morbid obese	2 (0.3)

Discussion

The goal of the National Food and Nutrition Strategy for Turkey is to protect and promote health through healthy nutrition, reduce the burden of diseases, while contributing to socio-economic development and a sustainable food security (11). So, it is clear that healthy eating is an important component of improvement of general population health. Healthy diet does not only mean being at the healthy weight, but also consuming the food and beverages such as fresh fruit, vegetables, calcium rich foods at recommended amounts according to the age groups (12).

The mean HEI scores of all adolescents indicate that overall dietary quality of adolescents is poor. 0.3% of adolescents had a good diet, 36.9% had poor diet and 62.8% had diet needs improvement. This might be considered, as all of the adolescents need improvement for their diets and nutritional habits. These results are not very different from the study conducted by Acar Tek et al. (4) in Ankara the capital of Turkey in which adolescents' dietary quality was evaluated with HEI. They also found out that the overall diet quality and nutritional habits of Turkish adolescents need modification and improvement with a result that 42.8% have poor diet and 57.2% need improvement with no one having a good diet. Differently they have found that HEI did not associate with age, gender and weight, while our results have shown HEI is significantly associated with sex and females had greater HEI scores. Similarly they have found a significant relationship between parental education and HEI as we did in this study (4). A study in Sao Paulo, Brazil evaluated diet quality of adolescents with HEI and they found 97.1% of the adolescents have a poor diet or they need improvement with an average HEI score 59.7. In contrast with our study they have found male adolescents have higher HEI scores (13). Among 2616 Canadian adolescents aged between

Table 2: Healthy Eating Index (HEI) scores by participants' characteristics.

n=596	HEI ≤50 points, n (%)	HEI 51–80 points, n (%)	Total, n (%)	p-Value
Gender				
Female	90 (31.7)	198 (68.3)	288 (100.0)	p=0.01[a]
Male	127 (41.2)	181 (58.8)	308 (100.0)	x^2=6.40
Age groups				
11–14 years	132 (38.2)	214 (61.8)	346 (100.0)	p>0.05
15–17 years	85 (34.0)	165 (66.0)	250 (100.0)	
Maternal education (n=586)				
University	108 (39.9)	163 (60.1)	271 (100.0)	p>0.05
Secondary school and lower	107 (34.0)	208 (66.0)	315 (100.0)	
Paternal education (n=586)				
University	83 (32.0)	176 (68.0)	259 (100.0)	p=0.038[a]
Secondary school and lower	132 (40.4)	195 (59.6)	327 (100.0)	x^2=4.30
Physical exercise (n=588)				
Regular	128 (38.7)	221 (63.3)	349 (100.0)	p>0.05
Irregular	86 (36.0)	153 (64.0)	239 (100.0)	
Chronic health problem (n=590)				
Yes	23 (31.1)	51 (68.9)	74 (100.0)	p>0.05
No	193 (37.4)	323 (62.6)	516 (100.0)	
Body mass index				
Underweight	61 (38.6)	97 (61.4)	158 (100.0)	p>0.05
Normal	113 (34.7)	213 (65.3)	326 (100.0)	
Overweight/obese	43 (38.4)	69 (61.6)	112 (100.0)	
Eating attitude				
Normal	184 (35.9)	328 (64.1)	512 (100.0)	p>0.05
Eating disorder	33 (39.3)	51 (60.7)	84 (100.0)	

[a]p<0.05 accepted statistically significant.

13 and 17, who were also evaluated with HEI, 8% of them had a poor diet while 71% had a diet needs improvement and 21% had a good diet. Similarly they have found overweight adolescents are more likely to develop eating disorders as they are more concerned about their weight (14).

Studies show that females have better diet quality than males (15, 16) and the results of the participants of the National Health and Nutrition Examination Survey (NHANES) showed that the diet quality of Americans differ by sex with females better scores of HEI (17). Children aged between 2 and 17 participated in NHANES study had HEI scores between 54.7 and 59.6 (18). In Greece, a study that was conducted among 525 adolescents have shown similar results such as maternal education is directly related with a healthier diet but differently they have found boys have healthier attitudes than girls. Their results also showed that there is a significant association between the age of the adolescents and healthy diet. In early adolescence students have healthier diet (19). Such like having healthy dietary patterns in early adolescence in our study they are found to have higher risk for eating disorders in spite of eating disorders typically occur during mid to late adolescence (20) while we have found differently as in early adolescence eating disorders are more frequent.

Overweight adolescents are more likely to develop eating disorders. In a study evaluating eating disorder symptoms in 7082 early adolescents at age 13 it is found that overweight adolescents have higher prevalence of eating disorders similar to our results (21). In a study about eating disorder characteristics in 1197 adolescents aged between 12 and 18, it was shown that overweight adolescents are more dissatisfied with their weight and are more likely to develop eating disorders with an odds ratio 10.23 (22). Like overweight adolescents obese adolescents are also have a higher risk for evolving disorders that is also shown in a study with 99 obese adolescents. It is found that obese adolescents have a higher risk independently from age and sex (23). A study in 179 adolescents had found a 36.7% prevalence of eating disorders and the ones who had eating disorders have all a overweight history (24).

Table 3: Eating attitude scores by participants' characteristics.

n=598	Eating attitude ≤30 points, n (%)	Eating attitude >30 points, n (%)	Total, n (%)	p-Value
Gender				
Female	250 (86.5)	39 (13.5)	289 (100.0)	p>0.05
Male	263 (85.1)	46 (14.9)	309 (100.0)	
Age groups				
11–14 years	280 (80.9)	67 (19.1)	347 (100.0)	p<0.001[a]
15–17 years	233 (92.8)	18 (7.2)	251 (100.0)	x^2=17.59
Maternal education (n=588)				
High school/university	241 (88.3)	32 (11.7)	273 (100.0)	p>0.05
Secondary school and lower	262 (83.2)	53 (16.8)	315 (100.0)	
Paternal education (n=588)				
Secondary school and lower	288 (87.8)	40 (12.2)	328 (100.0)	p>0.05
High school/university	215 (82.7)	45 (17.3)	260 (100.0)	
Physical exercise (n=590)				
Regular	298 (85.1)	52 (14.9)	350 (100.0)	p>0.05
Irregular	208 (86.4)	32 (13.6)	240 (100.0)	
Chronic health problem (n=592)				
Yes	56 (75.7)	18 (24.3)	74 (100.0)	p=0.009
No	451 (87.2)	67 (12.8)	518 (100.0)	x^2=6.83
Body mass index				
Normal and underweight	425 (87.4)	61 (12.6)	486 (100.0)	p=0.015
Overweight and obese	88 (78.6)	24 (21.4)	112 (100.0)	x^2=5.88

[a]p<0.05 accepted statistically significant.

Table 4: Total HEI and component scores of students included in the study.

	Mean	Std error (±)
Grains	6.53	0.15
Vegetables	4.73	0.15
Fruits	3.63	0.14
Dairy	4.39	0.15
Meat	6.65	0.14
Total fat	3.51	0.17
Saturated fat	2.88	0.16
Cholesterol	5.88	0.19
Sodium	6.77	0.16
Variety	7.84	0.13
Total	38.31	0.97

According to FAO Food Balance Sheets, Turkish people appeared to be well nourished. The total protein consumption per capita was estimated as high, but misdistribution and the poor quality of much if the food consumed in Turkey are not properly demonstrated in food balance sheets (5).

Turkey is a major agricultural producer. With respect to its climate and land nature, Turkey is suitable for the product of various products. Grain is a staple food of the Turkish people and a major percentage of energy comes from bread (48%) and other cereals (58%) (5); while the adolescents did not have enough scores for grains regarding HEI.

Mostly saturated fat and total fat intake scores and fruit consumption scores were low, indicating that they consume foods high in saturated fat and while their dairy and vegetable consumptions were also below the half of adequate amounts.

Obesity is increasing in most high-income countries, in developing countries undergoing nutrition transition, and even poor countries. The situation in developing countries varies widely regarding urbanization and income, but obesity is not merely a problem of high-income group (24).

The health consequences of overweight and obesity in adolescence include psychosocial problems, increased cardiovascular risk factors, abnormal glucose metabolism, hepatic gastrointestinal disturbances sleep apnoea and orthopedic complications. Obesity in adolescence may have serious problems health and psychological difficulties that also persist through adult years (25), although for others, obesity in adolescence may have limited emotional implications (26). Adolescents are sensitive about body image and obese teenagers are especially vulnerable to social discrimination (24).

Excessive consumption of energy-dense foods is a major contributor to weight gain during adolescence. But,

interventions directed at this population have achieved limited success (27, 28). Complex psychological changes in adolescence period have been offered as an explanation for the lack of efficacy in dietary interventions (29).

This study has some limitations. First it was conducted in a region so our results may not reflect whole population. There may be some recall bias since HEI scores based on students statements.

Conclusion

In conclusion, percentage of adolescents having poor diet is high among in our study group. Almost all of the participants needs either development or major changes in their eating behaviors. Interventions aiming high quality diet among adolescents are strongly recommended.

Conflict of interest statment

Declaration of conflicting interest: The authors declare that there are no conflict of interests.

Authors' contributions: BO has participated study design, conducted the study and written the manuscript. HA has designed the study and contributed to statistics and manuscript writing. MA has done the statistics and contributed to writing of the manuscript. OZ has contributed to study design and written the manuscript. OH has contributed to study design and to conducting the study and also to writing of the manuscript.

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