Original Article

Obesity in adolescents and the risk factors

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ABSTRACT

Objectives: This study aims to investigate the frequency of obesity and to identify possible risk factors affecting obesity in adolescents.

Materials and methods: This cross-sectional study included a total of 1,357 adolescents between March 2011 and May 2012 in Beyoglu district of Istanbul province of Turkey. The questionnaire including 38 questions which was developed based on the Youth Risk Behavior Survey, which is used by the Center for Disease Control and Prevention (CDC), was used for the data collection. The weight and height of the participants were measured and their body mass index (BMI) values were calculated.

Results: Of all participants, 54.8% were females, 5% of them were underweight, 12.6% were overweight, and 2.6% were obese. Among the male participants, the BMI values were higher (21.06 ± 3.32 kg/m^2) than females (20.26 ± 2.88 kg/m^2) ($p<0.0001$). The obesity ratio was higher in males ($p<0.0001$) and in children of highly educated parents ($p<0.05$). Of the participants, 23.5% were physically active. Physical activity level was higher in males, compared to females ($p<0.0001$). The rate of breakfast habit was higher in males than females ($p=0.002$). Healthy diets and losing weight in a healthy way were more commonly accepted by the students in the public schools, compared to those in private schools ($p<0.0001$).

Conclusion: Obesity is an important public health problem and proper eating habits and regular physical activity should be encouraged. High-income families should also encourage their children to become more aware of the importance of physical activity. The right time for this is childhood and adolescence, in which permanent habits can be easily acquired.

Keywords: Adolescent; diet; high school; obesity; physical activity.

A sufficient and well-balanced diet is one of the basic conditions not only for the vital activity of the individuals, but also for the improvement of a whole community. Adolescence and school age are the most critical periods which lifelong habits are acquired. Unhealthy diet habit is one of the risky behaviors seen during this period.[1-3] Unhealthy diets in adolescents may cause growth failure, delayed puberty, iron deficiency anemia, pudginess, slimness, and obesity.[2,4-8]

All over the world, there has been an increase in the prevalence of obesity.[4,5,8-10] The analysis of the International Obesity Task Force (IOTF) in 2010 has estimated that, all over the world, there are nearly 1 billion overweight and 475 million obese individuals, 200 million overweight and 40 to 50 million obese school-age children.[11] In Turkey, a study including 6 to 18 years of children has demonstrated that the ratio of overweight is 8 to 14% and the ratio of obesity is 3 to 31%.[9,12]

In the past few ears, due to social pressure, adolescents are forced to have a definite body size and image; however, fast food nutrition and less physical activity are the main cause of an increased prevalence of obesity, particularly among adolescents living in cities.[13]

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Due to decreased physical activity, obesity is now an important health issue among adolescents. Both inadequate physical activity and sedentary lifestyle are the major factors affecting obesity both in childhood and adolescence.[14]

According to the Dietary Guidelines prepared for Turkey by the World Health Organization (WHO), one of the most important facts on the increased obesity is the widespread sedentary lifestyle and, therefore, regular physical activity is the basic component of a healthy lifestyle.[12]

In the present study, we aimed to investigate the frequency of obesity among the 9th Grade high school students and to identify possible risk factors affecting obesity.

MATERIALS AND METHODS

A written informed consent was obtained from each participant. The study protocol was approved by the Committee of Istanbul Provincial Directorate for National Education. The study was conducted in accordance with the principles of the Declaration of Helsinki.

This cross-sectional study included 9th Grade high school students between March 2011 and May 2012 in Beyoglu district of Istanbul province of Turkey. There were a total of 3,150 students. Type 1 error was set as 0.05, and acceptable error ratio was set as 5% with 95% confidence interval. Considering 10.2% drop outs, the sample size was calculated as 378 students. However, we attempted to reduce the sample error as much as possible by keeping the sample size as large as possible. As a result, approximately half of the universe was selected as a sample. A total of 1,575 students were sampled randomly among all 9th Grade high school students according to the random number table and the field research was completed with a total of 1,534 students who were volunteers for the study.

In this cross-sectional study, the data were collected via a questionnaire using the face-to-face interview technique. The questionnaire including 38 questions which was developed based on the Youth Risk Behavior Survey (YRBSQ), which is used by the Center for Disease Control and Prevention (CDC), was used for the data collection.[15] The YRBSQ is a student health survey conducted biennially in the United States since 1990. Specifically, the survey was developed to monitor the prevalence of health risk behaviors among high school students (Grades 9 to 12) to identify main causes of morbidity and

mortality among youth and adults. The reliability of the YRBSQ was conducted by Brener et al.,[16] and it was adopted into Turkish by Kurdak et al.[17]

In the present study, the questionnaire had three sections: the first section including sociodemographic and anthropometric characteristics of the participants (10 questions), the second section including dietary habits and fast food consumption rates (20 questions), and the third section including physical activities (8 questions) (see Appendix).

The BMI= Weight (kg)/Height (m²) formula was used. For the BMI classification, the 2007 WHO standards were used as reference values.[18] The students were grouped into four categories according to their BMI values as underweight between -3 standard deviation (SD) and -2 SD, normal between -2 SD and +1 SD, overweight between +1 SD and +2 SD, and obese over + 2 SD. The students were, then, divided into three groups according to the physical activity levels, kind of activity, activity frequency, and the daily activity duration as inactive, moderately active, and active. Inactive students were those who did not exercise within the past week of the survey. Moderately active students were those who biked, walked, played table tennis, or played folk dance for at least 30 min five times a week without sweating

Table 1. Sociodemographic characteristics of students

	n	%
Sex		
Male	693	45.2
Female	841	54.8
School		
Anatolian high school	387	25.2
Collage	240	15.6
Labor school	494	32.3
Minority group high school	413	26.9
Level of income		
Low	161	10.9
Mid	1141	77.0
High	179	12.1
Any disease		
No	1339	89.0
Yes	166	11.0
BMI (according to WHO classification)		
Underweight	68	5.0
Normal	1083	79.8
Over weight	171	12.6
Obese	35	2.6
Paternal educational status		
Primary education	873	57.8
High school and more	637	42.2
Maternal educational status		
Primary education	989	66.1
High school and more	508	33.9

BMI: Body mass index; WHO: World Health Organization.

and panting. Active students were those who played football, run, or played volleyball or basketball during at least 20 to 60 min at least three times a week with panting and sweating.[19] All variables were compared according to sex, physical activity level, and the type of the school attended.

Statistical analysis

Statistical analysis was performed using IBM SPSS for Windows version 20.0 software (IBM Corp., Armonk, NY, USA). Descriptive data were expressed in mean and SD, and percentage for continuous variables. The Pearson's chi-square test (χ^2) and Fisher's exact test were used to analyze significant differences of categorical variables among the groups. A p value of <0.05 was considered statistically significant.

RESULTS

Of 1,357 adolescents, 54.8% were females and 45.2% were males with a mean age of 15.49±3.75 (range 15 to 17) years.

A total of 5% of the students were underweight, 79.8% were normal, 12.6% were overweight, and 2.6% were obese. The sociodemographic characteristics of the students are shown in Table 1. The ratio of obesity among the students of highly educated parents (high school and higher) was higher compared to those of poorly educated parents (p<0.05).

The mean BMI was higher in males than females (p<0.0001). The ratio of being overweight or obese was higher in males than females (p<0.001). The ratio of females who preferred low-calorie, fat-free foods or eating less to lose weight was higher than those of the males (p<0.001). The ratio of females who went hungry for 24 hours or more to lose weight or maintain their weight was higher than those of the males (p<0.05). Male participants had a more regular eating breakfast habit than female participants (p<0.05) (Table 2).

The ratio of the students who exercised to lose weight was higher in the group attending to public

Table 2. A comparison of variables according to sex

	Male		Female		
	n	%	n	%	p
Weight status					<0.0001*
Underweight	29	4.6	39	5.4	
Normal	478	75.9	605	83.2	
Overweight	102	16.2	69	9.5	
Obese	21	3.3	14	1.9	
Having breakfast status					0.002**
Never, sometimes	241	34.9	359	42.7	
Usually, everyday	449	65.1	481	57.3	
Have you ever exercised to lose or control your weight?					0.601**
Yes	276	39.9	345	41.2	
No	416	60.1	492	58.8	
Have you ever preferred non-fat food or eat less to lose or control your weight?					<0.0001**
Yes	172	24.9	356	42.6	
No	520	75.1	479	57.4	
Have you ever starved for 24 hours or more to lose or control your weight?					0.021**
Yes	23	3.3	49	5.8	
No	668	96.7	789	94.2	
Have you ever preferred high fat food or overeating to gain weight?					0.01**
Yes	129	18.8	66	7.9	
No	556	81.2	772	92.1	
Have you ever taken pills, powders, drinks to gain weight without medical advise?					0.002**
Yes	21	3.1	7	0.8	
No	661	96.9	831	99.2	
Frequency of bringing food to school					0.002**
Never, sometimes	587	86.3	679	81.8	
Usually, everyday	93	13.7	151	18.2	

* Pearson's chi-square test was performed; ** Fisher's exact test was performed; p<0.05 was considered statistically significant.

Table 3. A comparison of characteristics of students according to types of school attended

	Public		Private		
	n	%	n	%	p
Weight status					0.010*
Underweight	5.3	58	3.8	10	
Normal	80.6	881	76.8	202	
Overweight	12.2	134	14.1	37	
Obese	1.9	21	5.3	14	
Having breakfast status					<0.0001**
Never, sometimes	41.6	511	29.6	89	
Usually, everyday	58.4	718	70.4	212	
Have you ever exercised to lose or control your weight?					<0.0001**
Yes	35.6	438	61.0	183	
No	64.4	791	39.0	117	
Have you ever preferred non-fat food or eating less to lose or control your weight?					<0.0001**
Yes	32.2	395	44.2	133	
No	67.8	831	55.8	168	
Have you ever starved for 24 hours or more to lose or control your weight?					0.313**
Yes	4.9	60	4.0	12	
No	95.1	1168	96.0	289	
Have you ever vomited or taken cathartics to lose or control your weight?					0.168**
Yes	1.6	20	2.7	8	
No	98.4	1208	97.3	293	
Have you ever taken pills, powders, drinks to lose weight without medical advise?					0.209**
Yes	1.5	18	2.3	7	
No	98.5	1205	97.7	294	
Frequency of bringing food to school					<0.0001**
Never, sometimes	87.5	1062	68.9	204	
Usually, everyday	12.5	152	31.1	92	

* Pearson's chi-square test was performed; ** Fisher's exact test was performed; p<0.05 was considered statistically significant.

schools than the ratio of those attending to private schools (p<0.0001). The ratio of the students who were having breakfast regularly and the ratio of the students who were taught the concept of weight loss in a health way and healthy diet topics was higher in the group attending to public schools than those attending to private schools (p<0.0001) (Table 3).

A total of 23.5% of the students were physically active. The majority of physically active students were males (p<0.0001). The ratio of physically active students were higher in the group attending to private or minority schools than those of the group attending to public schools (p<0.05). The ratio of the students who became aware of the importance of physical activities during the last school period was higher in the group attending to private schools than the group attending to public schools (p<0.05). Physically active students had a more regular eating breakfast habit than less active or inactive ones (p<0.05). In addition, the students who were sleeping less than eight hours

during the school period were more active than the others (p<0.05) (Table 4).

DISCUSSION

Currently, obesity is a major important public health concern. All over the world, the prevalence of obesity has been continuously increasing.[4,5,7-10] In the present study, 2.6% of the adolescent participants were obese. Several studies have shown that the prevalence of obesity in different regions of Turkey ranges between 2 to 2.3%.[20,21] Our study results are also consistent with previous literature findings. However, the WHO Regional Office for Europe highlights that nearly 20% of children and adolescents in Europe are overweight and one of three is obese.[22] This indicates that the prevalence of obesity in adolescents in Turkey is lower than that of Europe.

In the present study, we found that 16.2% of male participants were overweight and the 3.3% of them were obese. Among females, these rates were 9.5% and 1.9%,

Table 4. Variables according to physical activity levels of students

	Inactive		Moderate active		Active		
	n	%	n	%	n	%	p
Sex							<0.0001*
Male	22.4	150	38.7	259	38.9	260	
Female	51.6	425	36.2	299	12.2	101	
School status							0.001*
Public	40.5	486	36.9	443	22.6	271	
Private	30.3	89	39.1	115	30.6	90	
Level of income							<0.0001*
Low	43.6	68	31.4	49	25.0	39	
Mid	39.6	441	37.9	421	22.5	250	
High	25.3	44	39.6	69	35.1	61	
Paternal educational status							0.003*
Primary school	42.3	361	35.9	307	21.8	186	
High school and more	33.9	209	38.7	239	27.4	169	
Maternal educational status							0.001*
Primary school	41.4	398	36.8	353	21.8	209	
High school and more	32.7	163	38.4	192	28.9	144	
Having breakfast status							0.006*
Never, sometimes	42.6	250	37.0	217	20.4	120	
Usually, everyday	35.7	322	37.6	340	26.7	241	
Have you been taught benefits of physical activity?							0.021*
Yes	33.6	157	38.3	179	28.1	131	
No	40.6	327	37.0	280	22.4	169	
Have you ever exercised to loose or control your weight?							<0.0001*
Yes	23.4	142	41.3	250	35.3	214	
No	48.7	430	34.9	308	16.4	145	
Night's sleep status							0.032*
Less than 8 hours	35.6	298	39.5	331	24.9	209	
More than 8 hours	42.1	274	34.8	226	23.1	150	
Body mass index							0.448*
Underweight	47.8	32	37.3	25	14.9	10	
Normal	36.8	388	38.3	404	24.9	263	
Overweight	37.8	62	36.6	60	25.6	42	
Obese	39.4	13	30.3	10	30.3	10	

* Pearson's chi-square test was performed; p<0.05 was considered statistically significant.

respectively. A study by Aksoydan et al.[23] reported that 18% of boys were overweight, and 6% were obese. Among girls, these rates were 11.8% and 2.4%, respectively. In the light of the results of these studies and our study, we can conclude that obesity is more prevalent among male adolescents, compared to female adolescents.

In addition, we observed that the obesity rates increased as the educational status of parents of participants increased. Similarly, in several studies conducted in different regions of Turkey, the prevalence of obesity in adolescents increased, as the educational status of the mother increased.[24,25] This can be interpreted as such that the prevalence of obesity increases parallel to the high income of highly educated families. However, we were unable to find an increased prevalence of obesity among students who had a high family income, which highlights the need for further studies.

In the present study, we found that female participants preferred low calorie, fat-free foods or eating less to lose weight more often than male participants. In many studies involving adolescent students, dieting was more common among females than males.[8,26-29] Despite the fact that the prevalence of obesity was higher among male participants, dieting was more common among girls in our study. This can be attributed to the fact that females consider themselves more overweight than they actually are, compared to male peers. Similarly, a study involving the first class high school students also showed that considering oneself overweight is more common among females than males.[30]

Furthermore, in the present study, we also found that nutrition and losing weight in a healthy way were much more taught at public schools, compared to private schools. In their study, Akman et al.[31] showed

that most of the students took healthy nutrition lessons, although only 15.2% of them internalized the concept of healthy dietary habit. On the other hand, the prevalence of obesity in adolescents was found to be unrelated to being educated about healthy diet at school.

Missing the breakfast may cause problems during childhood growth period and may have adverse effects on the school success.[32] However, missing a meal is a common behavior among adolescents. Various studies have shown that the most missed meal is breakfast among adolescents.[31-33] Similarly, totaly 60.6% (65.1% male, 53.7% female) of the participants were having a regular breakfast in our study. Previous studies conducted in Turkey also demonstrated that the rate of having regular breakfast ranged between 60 and 66%,[5,34] similar to our study results. In Europe, Portugal, Spain, Holland and Italy, this rate has been estimated as 56 to 94%.[7,9] The rate of having regular breakfast during adolescence in Turkey is also lower than that of Europe. The rate of having regular breakfast habit of male participants in our study was higher than that of the female participants. The recent studies have also shown that the habit of having regular breakfast is lower among females, compared to males,[35,36] consistent with our study results. This can be attributed to the fact that female teenagers are more sensitive about controlling their weight and they usually spend much more time for dressing and make-up before leaving the house for school.

On the other hand, in the literature, it has been shown that missing breakfast may cause increased BMI values.[7,9] Therefore, we believe that it is essential to improve the actual educational programs and to increase the public awareness to highlight the importance of having regular breakfast and to reduce the prevalence of obesity among adolescents.

In the present study, 23.5% of the students were physically active. The ratio of adolescents exercising regularly was found to be lower, compared to those who were inactive or less active. This result is consistent with the literature.[36] Providing opportunities for physical activities and encouraging the students for improving a healthy life style would make a positive contribution to avoid obesity.

In addition, male students were more active than female students in our study. Similarly, many studies also reported that male adolescents were more active than female ones.[8,20,22,37-39] In another study, it was found that female adolescents were less encouraged to attend to physical activities by their parents.[40] The reason of the significant differences in the physical activity levels between the two sexes may be due to sociocultural features of the individuals, since being physically active is much more accepted for males than females in Turkey.

In conclusion, obesity is an important public health problem. Proper eating habits and physical activity habits should be encouraged. The right time for this is the period of childhood and adolescence, in which permanent habits can be easily acquired. However, much work should be done on the positive effects of eating habits and physical activity by the parents and schools. In particular, high-income families should encourage their children to become more aware of physical activity. Further studies are needed to identify the level and effectivity of education on healthy diet to prevent the increase in the prevalence of obesity and to reduce the actual frequency during adolescence. In addition, more opportunities for physical activity should be maintained at schools.

REFERENCES

1. Bassett R, Chapman GE, Beagan BL. Autonomy and control: the co-construction of adolescent food choice. Appetite 2008;50:325-32.

2. Condon EM, Crepinsek MK, Fox MK. School meals: types of foods offered to and consumed by children at lunch and breakfast. J Am Diet Assoc 2009;109(2 Suppl):S67-78.

3. Sebastian RS, Wilkinson Enns C, Goldman JD. US adolescents and MyPyramid: associations between fast-food consumption and lower likelihood of meeting recommendations. J Am Diet Assoc 2009;109:226-35.

4. Stang J, Bayerl CT. Position of the American Dietetic Association: child and adolescent food and nutrition programs. J Am Diet Assoc 2003;103:887-93.

5. Garipağaoğlu M, Sahip Y, Budak N, Akdikmen O, Altan T, Baban M. Food types in the diet and the nutrient intake of obese and non-obese children. J Clin Res Pediatr Endocrinol 2008;1:21-9.

6. Uğuz MA, Bodur S. Konya il merkezinde ergenlik öncesi ve ergen çocuklarda aşırı ağırlık ve şişmanlık durumunun demografik özelliklerle ilişkisi. Genel Tıp Derg 2007;17:1-7.

7. Mota J, Fidalgo F, Silva R, Ribeiro JC, Santos R, Carvalho J, et al. Relationships between physical activity, obesity and meal frequency in adolescents. Ann Hum Biol 2008;35:1-10.

8. Vadiveloo M, Zhu L, Quatromoni PA. Diet and physical activity patterns of school-aged children. J Am Diet Assoc 2009;109:145-51.

9. DeJong CS, van Lenthe FJ, van der Horst K, Oenema A. Environmental and cognitive correlates of adolescent breakfast consumption. Prev Med 2009;48:372-7.

10. Trowbridge FL, Sofka D, Holt K, Barlow SE. Management of child and adolescent obesity: study design and practitioner characteristics. Pediatrics 2002;110:205-9.

11. International obesity task force (IOTF). The global epidemic, diabetes and obesity. Estimating the association between overweight and risk of disease. Available from: www.iaso.org/iotf. [Access date: May 05, 2015].

12. Türkiye Obezite ile Mücadele ve Kontrol Programı 2009. T.C. Sağlık Bakanlığı, Temel Sağlık Hizmetleri Genel Müdürlüğü. Erişim adresi: www.saglik.gov.tr. [Erişim tarihi: 31 Mayıs 2014].

13. Schneider D. International trends in adolescent nutrition. Soc Sci Med 2000;51:955-67.

14. Karacabey K. The effect of exercise on leptin, insulin, cortisol and lipid profiles in obese children. J Int Med Res 2009;37:1472-8.

15. Center for Disaes Control and Preventetation. Youth Risk Behavior Surveillance-United States, 2009. Surveillance Summaries. June 4. MMWR 2010;59:5.

16. Brener ND, Collins JL, Kann L, Warren CW, Williams BI. Reliability of the Youth Risk Behavior Survey Questionnaire. Am J Epidemiol 1995;141:575-80.

17. Kurdak H, Bozdemir N, Saatci E, Ozturk P, Ozcan S, Akpinar E. Self-perceived body weight status and weight-control behaviors of high school students in a southern city of Turkey. Coll Antropol 2010;34:1295-302.

18. WHO reference 2007. Growth Reference Data for 5-19 years. Available from: http://www.who.int/growthref/en. [Access date: July 14, 2015]

19. American College of Sports Medicine Position Stand. The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in healthy adults. Med Sci Sports Exerc 1998;30:975-91.

20. Kanbur NO, Derman O, Kinik E. Prevalence of obesity in adolescents and the impact of sexual maturation stage on body mass index in obese adolescents. Int J Adolesc Med Health 2002;14:61-5.

21. Sur H, Kolotourou M, Dimitriou M, Kocaoglu B, Keskin Y, Hayran O, et al. Biochemical and behavioral indices related to BMI in schoolchildren in urban Turkey. Prev Med 2005;41:614-21.

22. The challenge of obesity in the WHO European Region and the strategies for response, In: Branca F, Nikogosian H, Lobstein T, editors. Denmark: WHO; 2007.

23. Aksoydan E, Çakır N. Adölesanların beslenme alışkanlıkları, fiziksel aktivite düzeyleri ve vücut kitle indekslerinin değerlendirilmesi. Gülhane Tıp Dergisi 2011;53:264-70.

24. Pirinççi E, Durmuş B, Gündoğdu C, Açik Y. Prevalence and risk factors of overweight and obesity among urban school children in Elazig city, Eastern Turkey, 2007. Ann Hum Biol 2010;37:44-56.

25. Sağlam H, Tarım Ö. Prevalence and correlates of obesity in schoolchildren from the city of Bursa, Turkey. J Clin Res Pediatr Endocrinol 2008;1:80-8.

26. Fonseca H, Gaspar de Matos M. Perception of overweight and obesity among Portuguese adolescents: an overview of associated factors. Eur J Public Health 2005;15:323-8.

27. Larson NI, Story M, Eisenberg ME, Neumark-Sztainer D. Food preparation and purchasing roles among adolescent: Associations with sociodemographic characteristic and diet quality. J Am Diet Assoc 2006; 106: 211-8.

28. Neumark-Sztainer D, Wall M, Haines J, Story M, Eisenberg ME. Why does dieting predict weight gain in adolescents? Findings from project EAT-II: a 5-year longitudinal study. J Am Diet Assoc 2007;107:448-55.

29. Türk M, Gürsoy ŞT, Ergin I. Kentsel Bölgede Lise Birinci Sınıf Öğrencilerinin Beslenme Alışkanlıkları. Ege Üniversitesi Halk Sağlığı Anabilim Dalı 2007;17:81-7.

30. Akman M, Tüzün S,Ünalan P, Adölesanlarda sağlıklı beslenme ve fiziksel aktivite durumu. Nobel Medicus 2012;8:24-9.

31. Baysal A. Beslenme. 10. Baskı. Ankara: Hatiboğlu Yayınevi; 2004.

32. Vançelik S., Önal Gürsal S., Güraksın A., Beyhun E. Üniversite öğrencilerinin beslenme bilgi ve alışkanlıkları ile ilişkili faktörler. TSK Koruyucu Hekimlik Bülteni 2007;6:242-8.

33. Karasu Ö. Yatılı olan ve yatılı olmayan lise öğrencilerinin beslenme bilgisi ve durumlarının değerlendirilmesi. [Yüksek Lisans Tezi], Ankara: Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Aile Ekonomisi ve Beslenme Eğitimi Bilim Dalı; 2006.

34. Önder FO, Kurdoğlu M, Oğuz G, Özben B, Atilla S,Oral SN. Gülveren Lisesi son sınıf öğrencilerinin bazı beslenme alışkanlıklarının saptanması ve bunun malnutrisyon prevalansı ile olan ilişkisi. Hacettepe Toplum Hekimliği Bülteni 2000. Available from: http://www.thb. hacettepe. edu.tr/2000/20001.shtml. [Access date: June 22, 2015]

35. Gümüş H, Bulduk S, Akdevelioğlu Y. Yetiştirme yurtlarında kalan adolesanların beslenme ve fiziksel aktivite durumlarının vücut kompozisyonları ile ilişkisinin saptanması. Uluslararası İnsan Bilimleri Dergisi 2011;8:785-808.

36. Kara B, Hatun Ş, Aydoğan M, Babaoğlu K, Gökalp AS. Kocaeli ilindeki lise öğrencilerinde sağlık açısından riskli davranışların değerlendirilmesi, Çocuk Sağlığı ve Hastalıkları Dergisi 2003;46:30-7.

37. Inchley JC, Currie DB, Todd JM, Akhtar PE. Persistence sociodemographic differences in physical activity among Scottish schoolchildren 1990-2002. Eur J Public Health 2005;15:386-8.

38. Al Sabbah H, Vereecken C, Kolsteren P, Abdeen Z, Maes L. Food habits and physical activity patterns among palestinian adolescents: findings from the national study of Palestinian school children (HBSCWBG2004). Public Health Nut 2007;10:739-46.

39. Erginöz E, Alikaşifoğlu M, Ercan O, Uysal Ö, Ekici B, Kaymak DB ve ark. Türkiye'deki 11, 13, 15 yaşındaki okul çocuklarının fiziksel etkinlik düzeylerinin demografik özellikler, beslenme alışkanlıkları ve hareketsiz yaşam davranışlarıyla ilişkisi. Türk Pediatri Arşivi 2011;46:12-9.

40. Dollman J, Lewis NR. The impact of socioeconomic position on sport participation among South Australian youth. J Sci Med Sport 2010;13:318-22.

APPENDIX

	9th GRADE STUDENT SURVEY OF OBESITY AND PHYSICAL ACTIVITY			
1	**Age:**	**Gender:**	a) Male	b) Female
2	**What grade are you in:**		**Your weight:** .... kg	
3	**Your length:** .... cm			
4	**Your father's education:**	a) Not literate	b) Literate	c) Primary school
		d) High school	e) University	
5	**What is your father's occupation:**			
6	**What is your mother's education:**	a) Not literate	b) Literate	c) Primary school
		d) High school	e) University	
7	**What is your mother's occupation:**			
8	**What is the average monthly income of the family:** .... TL			
9	**How many brothers and sisters you have in total:**		**Your descendant of the family:**	
10	**Do you have any illnesses:**		a) No	b) Yes (please write) ....

	PHYSICAL ACTIVITY MODULE				
1	How many times have you been involved in sporting events in the past 12 months?				
	a) Never	b) Once	c) Twice	d) Three times and more	
2	During the past 7 days, how many days did you do muscle strengthening exercises such as push-ups, shuttles, weight lifting?				
	a) Never	b) One day	c) Two days	d) Three days	e) Four days
	f) Five days	g) Six days	h) Seven days		
3	During the past 7 days, how many days did you do stretching exercises such as touching your toes, knee bending, leg extension?				
	a) Never	b) One day	c) Two days	d) Three days	e) Four days
	f) Five days	g) Six days	h) Seven days		
4	How many hours do you sleep on average at school time?				
	a) Four hours or less	b) Five hours	c) Six hours	d) Seven hours	e) Eight hours
	f) Nine hours	g) Ten hours or more			
5	Did you learn in your lectures this year how to build a "fitness" plan?				
	a) Yes	b) No	c) I do not know		
6	Has the ways to protect yourself from injuries during physical activity been taught in your lectures this year?				
	a) Yes	b) No	c) I do not know		
7	Has the benefits of physical activity been taught in your lectures this year?				
	a) Yes	b) No	c) I do not know		
8	Have you been informed about physical activity facilities in your area this year?				
	a) Yes	b) No	c) I do not know		

NUTRITION MODULE				
1	How often did you have breakfast in the last 30 days?			
	a) Never	b) Rarely	c) Occasional	d) Most of the time	e) Always
2	How do you define your weight?			
	a) Very weak	b) Slightly weak	c) Right weight	d) Slightly overweight	e) Fairly overweight
3	Which of the following are you trying to do apply for your fitness?			
	a) I do nothing for my kilo	b) I try to lose weight	c) I try to get weight	d) I try to keep my weight	
4	Have you ever weighed and measured in the last 12 months?			
	a) Yes	b) No			
5	What's the main reason you're not having breakfast?			
	a) I always do	b) I do not have time	c) I can not eat early in the morning	d) There is not always the food at home	e) Other
6	Have you exercised in the last 30 days to lose weight or to protect your weight?			
	a) Yes	b) No			
7	Do you take diet pills, powder or drink without doctor's advice to lose or protect your weight in the last 30 days?			
	a) Yes	b) No			
8	Did you choose to eat low calorie, fat-free foods or less to lose weight or protect the weight in the last 30 days?			
	a) Yes	b) No			
9	Have you been hungry for 24 hours or more to lose weight or protect your weight in the last 30 days?			
	a) Yes	b) No			
10	Have you taken any medicines or laxatives to lose weight or protect your weight in the last 30 days?			
	a) Yes	b) No			
11	Have you exercised to gain weight in the last 30 days?			
	a) Yes	b) No			
12	Do you prefer to eat high calorie, fatty foods or more to gain weight in the last 30 days?			
	a) Yes	b) No			
13	Do you take pills, powder or drinks without doctor's advice to gain weight in the last 30 days?			
	a) Yes	b) No			
14	In the last 30 days, how often did you bring your lunch to school?			
	a) Never	b) Rarely	c) Sometimes	d) Most of the time	e) Always
15	How many times has breakfast been served at school during the last 30 days?			
	a) Never	b) Rarely	c) Sometimes	d) Most of the time	e) Always
16	How often have lunch been served in school in the last 30 days?			
	a) Never	b) Rarely	c) Sometimes	d) Most of the time	e) Always
17	How many times a day did you usually consume milk or dairy products in the last 30 days?			
	a) Never during the last 30 days	b) Less than one time per day	c) One per day	d) Two per day	e) Three per day
	f) Four per day	g) Five times or more per day			
18	How many times have you eaten salty food daily for the last 30 days?			
	a) I did not eat salty foods	b) Less than one time per day	c) One per day	d) Two per day	e) Three per day
	f) Four per day	g) Five times or more per day			
19	How many times a day have you consumed fatty foods in the last 30 days?			
	a) I did not eat greasy food	b) Less than one time per day	c) One per day	d) Two per day	e) Three per day
	f) Four per day	g) Five times or more per day			
20	How many times a day did you drink fruit juice in the last 30 days?			
	a) Never during the last 30 days	b) Less than one time per day	c) One per day	d) Two per day	e) Three per day
	f) Four per day	g) Five times or more per day			