Evaluation of body compositions, dietary habits and nutritional knowledge of health college students

Fatma Nişancı Kılınç[1], Deniz Çağdaş[2]

[1]Türkiye Yüksek İhtisas Hospital, Division of Nutrition and Diet, Ankara, Turkey
[2]Hacettepe University, Department of Pediatrics, Division of Pediatric Immunology, Ankara, Turkey

Summary

Aim: Our aim was to evaluate nutritional habits, knowledge of nutritional attitudes, nutritional consumption, and body composition of medical career college students.

Material and Method: The study included 172 female medical career college students. Anthropometric measurements, body composition, knowledge of nutrition, nutritional habits, frequency of food consumption and daily food consumption were evaluated.

Results: According to body mass index (BMI) percentiles, 13.9% were overweight-obese; 20.7% had waist circumference above the 90th percentile; 13.9% had systolic blood pressure (BP) above the 95th percentile, 5.8% had diastolic BP above the 95th percentile and 19.8% had systolic or diastolic BP above the 95th percentile. It was observed that 63.9% of the students had meals 3 times a day and 41.1% did not have breakfast at all. Energy consumption was inadequate in 28.9% and excessive in 5.3%. Carbohydrate consumption was inadequate in 5.3% and excessive in 6.6%. Protein consumption was inadequate in 35.5% and excessive in 18.4%. Approximately ⅓ of the students had improper attitudes about food consumption and they were unaware of food ingredients.

Conclusions: Achievement of proper feeding behavior begins from childhood. Even though they were receiving education in a health-related field, they possessed poor knowledge regarding eating habits and their attitude towards healthy diet was not promising. Therefore, regular educational programs about nutrition should be provided in schools. *(Turk Arch Ped 2012; 47: 179-186)*

Key words: Adolescent, anthropometric measurements, body composition, eating habits, obesity

Introduction

Adolescence is defined as the period between 10 and 19 years of age. This period is a special period during which growth and development reach the highest speed and transformation from childhood to adulthood occurs (1). While rapid growth and development increase the need for energy and nutritional elements, various problems may arise in meeting increased needs (2,3). Some of these problems may be related to the lifestyle of the adolescent and some may be related to wrong habits adopted beacuse of unconsciousness. Currently, unhealthy and unbalanced eating habits and related diseases are in the first order among biological and psychosocial health problems in adolescents (4).

Lifestyle behaviour including healthy eating habits are usually adopted or restructured during adolescence. Generally, many factors including family, peers and media affect these habits (2,3). Irregular meals, snacking between meals, habit of eating outside home and eating fast-food are typical features of eating habits during adolescence (1).

Adolescents are in a search of an identity, try to be independent and to be accepted and are much interested in their physical appearance (2,3). Wrong diets used to lose weight during this period cause inadequate and unbalanced nutrition. Another wrong habit is skipping a meal. The most commonly skipped meal is breakfast which is the most important meal. Inadequate and unbalanced nutrition has been reported to shorten the attention time of students, decrease perception, lead to difficulty in learning and behavior defects and absency in school and decrease in academic performance (3).

In Turkey, problems related to nutrition among shool-aged children and adolescents include slimness, obesity and related

180 Kılınç et al.
Nutritional habits and body composition of students

Turk Arch Ped 2012; 47: 179-186

problems, metabolic syndrome, avitaminoses, anemia, simple goiter and dental caries (4). This study was planned to evaluate eating habits, level of knowledge related to nutritional behavior, food consumption and body composition of the mothers of the future who receive more intensive education in medical career colleges in terms of health compared to other high schools.

Material and Method

In this study, female students between the ages of 14 and 17 in Pursaklar and Çubuk Medical Career Colleges during the period of 2009 were evaluated. Antropometric measurements were performed and body composition was measured in these students and a questionnaire related to level of knowledge of nutrition, eating habits, food consumption frequencies and food consumption status in one day was applied.

Body weight, waist and hip circumferrences were measured antropometrically and body composition analysis device was used for the other measurements.

Body mass index (BMI) percentiles were found using reference BMI percentile values of the Turkish children aged 6-18 years specific for age and gender prepared by Öztürk et al.(5). Children were evaluated to be obese when the body mass index was higher than the 95th percentile, overweight when the body mass index was between the 85th and 95th percentile, normal when the body mass index was between the 5th and 85th percentile and underweight when the body mass index was below the 5th percentile (6).

Waist circumference percentiles were determined using waist circumference percentile curves of the Turkish children between the ages of 7 and 17 specific for age and gender prepared by Hatipoğlu et al. (7). The ratio of waist circumference to height was also calculated for each student (8).

Fat percentage percentiles of the students were determined using the fat percentage percentiles specified for the healthy Turkish children (9). According to fat percentage percentile curves, a value below the 10th percentile was evaluated to be low weight and a value of 30th percentile or above was evaluated to be obese in girls (10,11).

Systolic and diastolic blood pressure was evaluated in three different times. Blood pressure percentiles of the students were determined using the percentile curves prepared by Park et al.(12). Systolic and diastolic blood pressure above the 95th percentile by age and gender is defined as hypertension.

Bioeletrical impedance analysis (BIA) of the students was performed using Tanita TBF 300M. In bioimpedance analysis, body analysis is performed by sending 50 kHz electrical flow to the body via foot electrodes. Bioelectrical impedance analysis was performed considering factors including fasting state in the morning, not having mensturation, not having performed severe physical activity in the last 24-48 hours, not having drunk excessive water and not having drunk caffeinated beverages in the last 24 hours. While performing bioelectrical impedance analysis, no metal was allowed to be carried on by the patient.

Bioelectrical impedence analysis device makes measurements according to variables including height, gender and age. Measurements were done when the individual was quiet and immobile. Thus, BMI, basal metabolism rate (BMR), fat tissue, non-adipose tissue, body water and their impedances were found (13).

To determine body image adolescent girls were asked about how they felt themselves (lean, normal, obese) with the help of a questionnaire. The responses were compared with the actual states which were evaluated with percentile curves. Daily food consumption was determined with daily recall-questioning technique. The adolescents were asked to record all food and beverages consumed the day before the interview together with their amounts.

Nutrients and their amounts included in the food and beverages consumed by the adolescents during one day were calculated using standard recipes (14). The results obtained were evaluated considering recommended daily allowment by age and gender. In the evaluation, recommended daily consumption levels [($\frac{2}{3}$=%67~%70) ±%33] were calculated as cut-off points. The students who took energy and nutritional elements at the recommended level (67-133%) were considered as adequate consumers. The students who took energy and nutritional elements below the recommended level (<67%) were considered as inadequate consumers. The students who took energy and nutritional elements above the recommended level were considered as excessive consumers (13).

In our country, four food groups are used in planning of basic food which should be consumed daily considering food production and nutritional status. These include milk group, meat-egg-legume group, vegetable and fruit group and bread and cereal group (2,3). Food consumption frequencies stated by the adolescents in the questionnaire were evaluated considering food groups. Different questions were asked to students using Likert type scale to determine awareness and attitude related to food consumption in purchasing and preperation of foods. The answers were coded as I agree and I don't agree. Approval was obtained for the questionnaire and for briefing meetings from the County National Education Directorate for the two schools where the study was conducted.

The study was descriptive and the data obtained were evaluated by computer using SPSS 15.0 (Inc.Chicago,IL). The compatibility of the variables to the normal distribution was examined by Kolmogorov-Smirnov test. The variables showing normal distribution were expressed as mean and standard deviation. The variables not showing normal distribution were expressed as median and the minimum-maximum value. The relations between the variables were evaluated with Pearson correlation test when the variables showed normal distribution and with Spearman correlation test when the variables did not show normal distribution. A p value of <0.05 was considered to be statistically significant.

Turk Arch Ped 2012; 47: 179-186

Kılınç et al.
Nutritional habits and body composition of students

181

Results

The mean age of the girls aged 14-17 years (n=172) included in the study was 15.7±0.9 years. Mean values of body weight, height and BMI are shown in Table 1. When the adolescents were evaluated in terms of body weight and height, it was found that the students had normal values according to their ages except for 8 students, three students were below the 5th percentile and 5 students were above the 95th percentile. When the BMI values of 172 adolescent girls were evaluated, 5 students were found to be obese and the others were found to be within normal limits. 13.9% of the students were found to be obese or overweight.

When waist circumference measurements were evaluated (n=139), 29 students (20.9%) were found have a waist circumference above the 90th percentile and all 24 students who were overweight or obese had a waist circumference above the 90th percentile.

When systolic and diastolic blood pressures (n=138) were evaluated, the systolic blood pressure was found to be above the 95th percentile in 19 students (13.9%) and the diastolic blood pressure was found to be above the 95th percentile in 8 students (5.8%). A total of 27 students (19.6%) had systolic and diastolic blood pressures above the 95th percentile.

Bioimpedence analysis results of a part of the adolescents (n=92) are shown in Table 1. According to body fat percentage,

11 students (14.5%) were found to be obese (fat percentage ≥30) and 2 students (2.6%) were found to be underweight (fat percentsge<10). When body fat percentages were evaluated, 10 students (13.1%) were found to have a body fat percentage below the 3rd percentile, three students (3,9%) were found to have a body fat percentage above the 97th percentile and 10 students (13.1%) were found to have a body fat percentage above the 85th percentile.

Body images, some eating habits and familial characteristics of the adolescents are shown in Table 2.

Daily energy and food elements taken by the adolescents (n=149) are shown in Table 3. When the sources of energy

Table 1. Antropometric measurements and bioimpedance analysis measurement results of the adolescents

Measurements	Mean±SD
Age (years)	15.9±1.1
Body weight (kg)	55.5±8.1
Height (cm)	160.8±5.7
Body mass index (kg/m^2)	21.5±3.5
Waist circumference (cm)	70.5±6.4
Hip circumference (cm)	94.2±6.4
Waist/hip	0.7±0.1
Waist/height	0.4±0.1
Systolic blood pressure (mm Hg)	102.6±13.5
Diastolic blood pressure (mm Hg)	62.0±8.9
Basal metabolism rate (kcal)	1419.8±78.2
Impedance (ohm)	563.4±63.7
Body fat tissue (kg)	13.3±5.8
Body fat tissue (%)	23.1±6.9
Non-adipose body tissue (kg)	42.3±3.5
Non-adipose body tissue (%)	77.1±7.1
Total body water (lt)	31.0±2.5
Total body water (%)	56.5±50.9

Table 2. Distribution of body images, some eating habits and familial characteristics in adolescents

Variables		n	%
Body image	Lean	10	13.2
	Normal	53	69.7
	Overweight	13	17.1
Presence of overweight	Yes	42	55.3
individuals in the family	No	34	44.7
Daily number of meals	<3	13	17.1
	3	50	65.8
	>3	13	17.1
Breakfast habit	Yes	46	60.5
	No	30	39.5
Presence of high blood pressure in the family	Yes	50	65.8
	No	26	34.2
Presence of diabetes mellitus	Yes	40	52.6
(Type II) in the family	No	36	47.4
Presence of atherosclerotic	Yes	29	38.2
disease in the family	No	47	61.8
Ailede şişmanlık varlığı	Yes	41	53.9
	No	35	46.1

Table 3. Energy and nutritional elements taken by the adolescents daily and the mean and SD values of the contribution of nutritional elements to the total energy

Nutritional elements (n=76)	X±SD
Energy	1927.5±640.1
Carbohydrates (gr)	296.9±112.3
Carbohydrates (%)	61.1±9.4
Protein (gr)	50.9±21.1
Protein (%)	10.5±2.9
Fat (gr)	60.4±24.2
Fat (%)	28.4±8.8

taken with the daily diet of the adolescents included in the study were examined, the ratio coming from carbohydrates was found to be below %55 in 18.4% of the adolescents, 55-60% in 18.4% and above 60% in 63.3%. The ratio coming from protein was found to be 15-20% in 5.3%, below 15% in 93.4% and above 20% in 1.3%. The raito coming from fat was found to be 20-30% in 55.3%, above 30% in 32.9% and below 20% in 11.8%.

Percentages of consumption of energy and nutritional elements of the adolescents according to RDA values are shown in Table 4. Daily consumption of four food groups (n=169) of the adolescents is shown in Table 5 and daily consumption of take-home foods is shown in Table 6.

The adolescents were found to consume averagely 6,9 glasses of water daily. The attitudes of the adolescents related to food consumption are shown in Table 7.

Table 4. Intake of energy and nutritional elements according to RDA values

Nutritional elements	Consumption by RDA values (%) X±SS
Energy	85±2,8
Carbohydrates	106±16
Protein	93±4,2

RDA: recommended daily allowment

Table 5. Daily consumption of four food groups in the adolescents

Food groups	Daily consumption	%
Meat group (meat. egg. legume)	Yes No	71 29
Milk group (milk. yogurt. cheese)	Yes No	29.3 70.7
Bread and cereal group (bread. rice. pasta)	Yes No	95 5
Fresh vegetables and fruit group	Yes No	38.8 61.2

Table 6. Daily consumption of take-home foods in adolescents

Take-home foods	%
Processed meat products (sausage, salami, hot dog)	53
Cola, soft drink, canned fruit juice	39.2
Instant sauces including catchup, mayonnaise, cream	38.7
Chips, French fries	32.1
Chocolate, cake, biscuits	36.6
Hamburger, pizza	4.2

No relation was found between eating breakfast and BMI in the adolescents (p=0.163). No significant relation was found between eating breakfast and total energy taken with the diet (p<0,05). The mean energy taken in the diet by the adolescents who never ate breakfast was found to be significantly decreased compared to the adolescents who always ate breakfast (rho=0.22, p<0.05). A positive relation was found between the number of meals taken and daily energy consumed (rho=0.29, p<0.001). No relation was found between daily energy taken and BMI, waist to height ratio, waist to hip ratio and waist circumference (p=0.524, p=0.531, p=0.832, p=0.765). A significant relation was found between daily total energy taken and the amount of protein (g) (r=0.786, p<0.001), energy taken from protein (r=0.787, p<0.001) and energy taken from fat (r=0.737, p<0.001).

In our study, the rate of the adolescents who felt themselves lean while they were actually obese was found to be 10.31% and the rate of the adolescents who felt themselves normal while they were actually obese was found to be 15.87% (n=126).

Discussion

Currently, the importance of healthy nutrition increases as the diseases related to nutrition increase. The frequency of obestiy is gradually increasing in children and adolescents as well as in adults. The rate of obesity during childhood considerably affects the rate of obesity in adulthood. It is known that 10% of school-aged children are overweight worldwide (2). In many countries childhood obesity has increased dramatically after 1990s and 1% of the children are added to the overweight group annually in developed countries (15).

Being overweight and obese during childhood and adolescence is related to early aging and physical diseases during adulthood (16). In our study, the rate of adolescents who were overweight and obese was found to be 13.9%. This rate is considerably high considering the facts that the study was conducted in a medical career college, only female students were included in the study and female students are more sensitive about body weight compared to male students.

In the study performed by Pileggi et al.(17) in 603 students aged 6-18 years, it was found that 11.1% of the students were obese which was similar to our study. Ogden et al. (18) found that BMI was above the 95th percentile in 16% of the adolescents and above the 85th percentile in 34%.

In our study, BMI value was found to be below the 5th percentile in 1.7% of the adolescents, above the 95th percentile in 2.9% and betwen the 85th and 95th percentiles in 11%. The low rate of students with a BMI value below the 5th percentile and above the 95th percentile was thought to arise from the low number of the subjects.

In the study perfromed by Kurtoğlu et al. (9), the body fat percentage was found to be above the 85th percentile in 17.5% of the girls between the ages of 6 and 18. In our study, the rate

Turk Arch Ped 2012; 47: 179-186

Kılınç et al.
Nutritional habits and body composition of students

183

Table 7. Attitudes of adolescents about food consumption

Attitudes about food consumption		Attending (%)	Disagree (%)
Appropriate consumer behavior	I pay attention if the package of the product is intact or not	78.9	21.1
	I return food products I purchase, if it is spoilt	65.8	34.2
	I pay attention if the product I have purchased has negative effect on human health	53.9	46.1
	I pay attention that the package has been prepared from a material which will not harm the food product	97.4	2.6
Conscious purchasing	I try not to purchase products which are harmful for the nature	44.7	55.3
	I always consider nutritional value when purchasing nutrients	85.5	14.5
	I pay attention to the expire date when purchasing nutrients	60.5	39.5
	I pay attention to mineral substances contained in the product when purchasing nutrients	90.8	9.2
	I read label information of the nutrients I purchase	86.8	13.2
	I know protein and vitamin contents of foods and try to learn the ones I don't know	78.9	21.1
Consciousness about food content and appropriate preparation of foods	I pay attention to prepare balanced meals	71.1	2.9
	I abide by the instructions on the package when keeping or cooking products	56.6	43.4
	I cook foods being sure about the nutrient content	85.5	14.5
	I agree to pay more money for hormone-free food products	34.2	65.8
Healthy foods	Nutritious foods are more important than tasteful foods	85.5	14.5
	It is important that preservatives are not added to nutrients	75	25
	Being nutritious is more important than being saturating for nutrients we consume	90.8	9.2
	I attach importance to the hygiene and cleanness in places where nutrients are produced	98.6	1.4
Taste and hygiene	Conditions of the places where nutrients are purchased (cleanness, hygiene, humidity) are very important	97.4	2.6
	It is very important that foods are tasteful	46.1	53.9

184 Kılınç et al.
Nutritional habits and body composition of students

Turk Arch Ped 2012; 47: 179-186

of adolescent girls with a body fat percentage above the 85th percentile evaluated according to body fat percentage percentiles was found to be lower (13.1%).

Waist/hip ratio and waist circumference measurements are the most common antropometric measurements used to determine body fat distribution and has been used as a predictor of the risk of metabolic syndrome which has defined the risk of chronic diseases in recent years (19). In addition, risk factors accompanying metabolic syndrome have been found to be related to a waist circumference above the 70th and 75th percentile in publications (8,20). In our study, 20.9% of the adolescents were found to have a waist circumference above the 90th percentile. This suggests that an important proportion of the adolescent girls included in our study are under risk in terms of metabolic syndrome. Çiçek et al. (21) found the waist circumference (66.9±6.5cm) to be lower in 2737 female students aged 14-17.9 years compared to our study.

One of the criteria of metabolic syndrome is increased systolic and diastolic blood pressure (22,23). In our study, systolic or diastolic blood pressure was found to be high in 19.6% of adolescent girls. Pileggi et al. (17) found high blood pressure in 3.5% of the students.

Waist to height ratio is a valuable indicator like waist circumference in the diagnosis of central obesity. This ratio determines the metabolic and cardiovascular risk in obese individuals independent of the age and gender (8,24,25). In our study, waist to height ratio was found to be similar to the result (0.44±0.04) obtained in the study performed in girls aged 14-17.9 years by Çiçek et al. (21).

When personal characteristics of the adolescents were evaluated, the rate of the ones who felt themselves lean while they were actually obese was found to be 10.31% and the rate of the ones who felt themselves normal while they were actually obese was found to be 15.87%. This shows that a part of the adolescents included in our study had defective body image. Türk et al. (26) found that 33.1% of the students found themselves overweight in the study they performed in students of high school grade 1 aged 14-18 years. Considering the fact that only girls were included in our study and it is known that female students are more sensitive in terms of body weight compared to male students the result we obtained was surprising.

The rate of dieting to lose weight (6%) in our study was similar to the result (6.6%) obtained in the study performed by Özmen et al. (27) in 2146 students who had a mean age of 16.6±0.7 and half of whom were female students. However, it was observed that BMI percentiles were between the 25-75th percentiles (normal body weight) in most of the students who dieted to lose weight in our study.

It can be said that breakfast which is the most important meal of the day becomes an omitted meal as the age and education level increase due to intensity experienced. However, breakfast has been proved to have an effect on academic success as well as on physical growth and development (28). It was found that adolescents included in our study did not eat breakfast. Studies have shown that absence of eating breakfast regularly lead to retardation in cognitive function and especially in the ability to recall (28). In our study, it was found that approximately 2/5 of the adolescents did not eat breakfast daily and this was similar to other studies performed (21). Studies show that the high rate of habit of eating breakfast regularly in the primary school period decreases gradually as one progresses towards university period (29,30). Habit of eating breakfast irregularly in adolescent girls may be a behavior developed to provide weight control or may arise from the fact that they spend more time to get prepared in the morning and do not have the possibility to eat breakfast.

In our study, a significant relation was not found between eating breakfast and BMI and between energy taken and BMI, waist to height ratio, waist to hip ratio and waist circumference, but this may be thought to arise from the low number of subjects. Fenandez Moralez et al. (31) found an inverse relation between BMI and energy uptake in breakfast in the study they performed in 467 adolescents aged 15-17 years.

In our study, it was found that the families of half of the adolescents had high blood pressure, diabetes mellitus (Type II), obesity and coronary artery disease. This rate was found to be slightly higher in our study compared to similar studies (25).

Water is very important in healthy, balanced and adequate nutrition. 2 liters of water in daily food and beverages is an adequate amount. However, 3 and even 10 liters may be required depending on the work style and in warm weather (32). In our study, adolescent girls were found to consume lower amounts of water than recommended and this was thought to arise from the fact that the study was conducted in the winter. In studies performed, increased consumption of fluid has been shown to lead to an increase in energy consumption at rest and thus an increase in weight loss (33).

It is known that 55-60% of diet energy should come from carbohydrates, 15-20% should come from protein and 25-30% should come from fats for a healthy and balanced nutrition (2). In our study, it was found that the rate of energy coming from carbohydrates was high and the rate of energy coming from protein was low. An intake of energy and nutritional elements below the 67% of the recommended value in adolescents is considered as inadequate intake, an intake between 67-133% is considered as adequate intake and an intake above the 133% is considered as excessive intake (13). Accordingly, approximately 1/3 of the adolescent girls were found to have inadequate energy consumption. It was found that most adolescent girls consumed an adequate amount of carbohydrate, but more than half of the students were found to take inadequate amount of protein. Yağmur (34) and Şanlıer et al. (35) found that university students consumed energy and carbohydrates inadequately. Çelik and Tokgöz (36) found that girls took 58.7±21.9 g protein and 63.3±22.9 g fat in the study they performed in students aged 18-20 years. In our study, protein consumption was found to be lower and fat

Turk Arch Ped 2012; 47: 179-186

Kılınç et al.
Nutritional habits and body composition of students

185

consumption was found to be similar. However, Hanning et al. (37) showed that the rate of total energy coming from protein (15%) and fat (31%) was higher and the rate coming from carbohydrates (54%) was lower compared to our study in the study they performed in 315 male adolescents and 346 female adolescents. Dapi et al. (38) found that more than 50% of adolescents aged 12-16 years consumed protein and 26% consumed fats with a lower rate than recommended and 26% consumed fats with a higher rate than recommended. In our study, low protein consumption may be thought to arise from the socioeconomic status of the students.

In the frame of healthy nutrition, meat, milk, cereal, fresh vegetables and fruit groups each should be consumed daily (13). This becomes more important in the adolescence period during which growth and development achieves the highest velocity (2). When daily consumption of the four food groups was evaluated in our study, it was found that 83% did not consume meat group, 70.7% did not consume milk group, 80,5% did not consume cereal group and 61.2% did not consume fresh vegetables and fruit group daily.

In our study, more than half of the adolescent girls were found to consume unhealthy foods including chocolate, cake, biscuits and 1/3 were found to consume chips, french fries, cola, soft drinks and canned fruit juices. This result is important in terms of showing that the education the students receive has no effect on a change in attitudes and behavior of the students. However, the rate of students who consumed unhealthy foods was much higher (98.8%) in the study performed by Demirezen et al. (4). In the study performed by Türk et al. (26) in adolescents aged 14-18 years, the most common unhealthy foods were found to be hotcake/biscuits, cathcup/mayonnaise, fried food, salami, hotdog and chips similar to our study.

In our study, most adolescents (84.2%) thought that the prize was important in purchasing nutrients. This was thought to arise from the fact that the students included in our study lived in a region with low socioeconomic status. Studies have shown that the socioeconomic level increases the importance given to the price of foods (39,40).

In our study, it was observed that approximately 1/3 of the adolescents showed inadequate attitudes related to food content consciousness and appropriate preperation of foods (Table 7). Topuzoğlu et al. (41) found similar results in their study. Chang et al. (42) found that 17.1% of the students had defective eating attitude and behavior and emphasized that these attitudes and behavior endangered nutritionals status of adolescents.

This study is important as it demonstrates the deficiencies in food consumption, eating habits and attitudes related to food consumption. Therefore, it is important to adjust nutritional education programs in schools regularly and continiuously.

Another result of our study was that the rates of obesity and high blood pressure were determined in the adolescent female student group. Although the number of subjects in our study was inadequate to make a general evaluation, general eating habits including not eating breakfast, skipping meals and

unbalanced intake of nutritonal elements were noted. It was observed that approximately 1/3 of the adolescents showed inappropriate attitudes and behavior related to food consumption and were unconscious about food content. In international studies performed in sporter adolescents, inadequate knowledge about nutrition was noted and it was emphasized that there was no relation between the level of knowledge about nutrition and eating habits (43,44).

Especially medical career students should adopt appropriate attitudes and behavior related to food consumption and general eating habits including eating breakfast, not skipping meals and balanced intake of food groups. It is important that deficiencies and inappropriateness in knowledge and habits of students who will give health care service and participate in correction and/or protection of the public's health and will be a model in this area have been demonstrated. We believe that this group should be handled primarily in terms of public health.

Conflict of interest: None declared.

References

1. Demir GC. Okul çağı çocukları ve adolesan beslenmesi. Türkiye Klinikler J Pediatr Sci 2005; 1: 25-30.
2. Baysal A. Beslenme. Besin grupları. 12. baskı. Ankara: Basım ve Yayım San. Tic. Ltd. Şti, 2009: 267-296.
3. Toprak I, Bunsuz O, Sentürk S, Yüksel B, özer H, Çakır B, Bideci AE. Toplumun beslenmede bilinçlendirilmesi Sağlık Bakanlığı, Hacettepe Üniversitesi. Saha personeli için toplum beslenmesi programı eğitim materyali 3. Basım, Ankara: Onur Matbacılık 2002; 110-114.
4. Demirezen E, Coşansu G. Adolesan çağı öğrencilerde beslenme alışkanlıklarının değerlendirilmesi. Sürekli Tıp Eğitim Dergisi 2005; 14(8): 174.
5. Ozturk A, Mazicioglu MM, Hatipoglu N, Budak N, Keskin G, Yazlak Z, Balci N, Yildiz H, Yildiz K, Ustunbas HB, Kurtoglu S. Referance body mass index curves for Turkish children 6 to 18 years of age. J Pediatr Endocrinol Metabolism 2008; 21: 827-836.
6. Lahti-Koski M, Gill T. Defining childhood obesity. In: Kiess W, Marcus C, Wabitsch M, (eds.) Obesity in childhood and adolescence. Basel: Karger, 2004; 9: 1-19.
7. Hatipoglu N, Ozturk A, Mazicioglu MM, Kurtoglu S, Seyhan S, Lokoglu F. Waist circumference percentiles for 7- to 17-year-old Turkish children and adolescents. Eur J Pediatr 2008; 167: 383-389.
8. Savva SC, Tornaritis M, Savva ME, Kourides Y, Panagi A, Silikiotou N, Georgiou C, Kafatos A. Waist circumference and waist-to-height ratio are better predictors of cardiovascular disease risk factors in children than body mass index. Int J Obes Relat Metab Disord 2000; 24: 1453-1458.
9. Kurtoglu S, Mazicioglu MM, Ozturk A, Hatipoglu N, Cicek B, Ustunbas HB. Body fat reference curves for healthy Turkish children and adolescents. Eur J Pediatr 2010; 169(11): 1329-1335.
10. Antal M, Péter S, Biró L, Nagy K, Regöly-Mérei A, Arató G, Szabó C, Martos E. Prevalence of underweight, overweight and obesity on the basis of body mass index and body fat percentage in Hungarian schoolchildren: representative survey in metropolian elementary schools. Ann Nutr Metab 2009; 54: 171-176.
11. Williams DP, Going SB, Lohman TG, Harsha DW, Srinivasan SR, Webber LS, Berenson GS. Body fatness and risk for elevated blood pressure, total cholesterol and serum lipoprotein ratios in children and adolescents. Am J Public Health 1992; 82: 358-363.
12. Park MK, Menard SW, Yuan C. Comparison of blood pressure in children from three ethnic groups. Am J Cardiol 2001; 87:1305-1308.
13. Baysal A, Aksoy M, Besler HT, ve ark. Diyet el kitabı. 4. Baskı. Ankara: Hatiboğlu Yayınevi Şahin Matbaası, 2002.

186 Kılınç et al.
Nutritional habits and body composition of students

Turk Arch Ped 2012; 47: 179-186

14. Kutluay T. Standart yemek tarifeleri. Toplu beslenme yapılan kurumlar için standart yemek tarifeleri. 1. Baskı. Ankara: Cihan Matbaası, 1991.

15. Hatun S, Çizmecioğlu F. Çocuklarda metabolik sendrom. Çocuk Sağlığı ve Hastalıkları Dergisi 2005; 48: 257-265.

16. Reilly JJ, Kelly J. Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review. Int J Obes 2011; 35(7): 891-898.

17. Pileggi C, Carbone V, Nobile CG, Pavia M. Blood pressure and related cardiovascular disease risk factors in 6-18 year-old students in Italy. J Paediatr Child Health 2005; 41(7): 347-352.

18. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. JAMA 2006; 295: 1549-1555.

19. Baysal A, Baş M, (ed.) Yetişkinlerde ağırlık yönetimi. Birinci basım. Ankara: Türkiye diyetisyenler yayını, Ekspres baskı A.Ş, 2008.

20. Moreno LA, Pineda I, Rodríguez G, Fleta J, Sarría A, Bueno M. Waist circumference for the screeningof the metabolic syndrome in children. Acta Paediatr 2002; 91: 1307-1312.

21. Cicek, B, Ozturk A, Mazicioglu MM, İnanç N, Kurtoğlu S. A novel cut-off for abdominal obesity derived from various anthropometric indices to predict body composition: Arm fat area. Turk J Med Sci 2010; 40(4): 515-523.

22. Iannuzzi A, Licenziati MR, Acampora C, Renis M, Agrusta M, Romano L, Valerio G, Panico S, Trevisan M. Carotid artery stiffness in obese children with the metabolic syndrome. Am J Cardiol 2006; 97: 528-531.

23. Atabek ME, Pirgon O, Kurtoglu S. Prevalence of metabolic syndrome in obese Turkish children and adolescents. Diabetes Res Clin Pract 2006; 72: 315-321.

24. Kahn HS, Imperatore G, Cheng YJ. A population-based comparison of BMI percentiles and waist-to-height ratio for identifying cardiovascular risk in youth. J Pediatr 2005; 146: 482-488.

25. Maffeis C, Banzato C, Talamini G. Obesity study group of the Italian society of pediatric endocrinology and diabetology. Waist-to-height ratio, a useful index to identify high metabolic risk in overweight children. J Pediatr 2008; 152: 207-213.

26. Türk M, Gürsoy T, Ergin I. Kentsel bölgede lise birinci sınıf öğrencilerinin beslenme alışkanlıkları. Genel Tıp Dergisi 2007; 17: 81-87.

27. Özmen D, Cetinkaya AC, Ergin D, Şen N, Erbay DP. Lise öğrencilerinin yeme alışkanlıkları ve beden ağırlığını denetleme davranışları. TSK Koruyucu Hekimlik Bülteni 2007; 6(2): 98-105.

28. Baysal A. Kahvaltı ve okul başarısı. Beslenme ve Diyet Dergisi 1999; 28: 1-3.

29. Mazıcıoglu M, Oztürk A. Üniversite 3. ve 4. sınıf öğrencilerinde beslenme alışkanlıkları ve bunu etkileyen faktörler. Erciyes Tıp Dergisi 2003; 25: 172-178.

30. Önder FO, Kurdoğlu M, Oğuz G, Özben B, Atilla S, Oral SN. Gülveren Lisesi son sınıf öğrencilerin bazı beslenme alışkanlıklarının ve bunun malnütrisyon prevalansı ile olan ilişkisi. Hacettepe Toplum Hekimliği Bülteni 2000; 21(1): 1-5.

31. Fernández Morales I, Aguilar Vilas MV, Mateos Vega CJ, Martínez Para MC. Breakfast quality and its relationship to the prevalence of overweight and obesity in adolescents in Guadalajara (Spain). Nutr Hosp 2011; 26(5): 952-958.

32. Ekin İ. A'dan Z'ye dengeli beslenme. Spor Med Yayınları No:1. 3. basım. Ankara: EMO Teknik malzeme Tic. San. Ltd. Şti 1996: 197-204.

33. Dubnov-Raz G, Constantini NW, Yariv H, Nice S, Shapira N. Influence of water drinking on resting energy expenditure in overweight children. Int J Obes (Lond) 2011; 35(10): 1295-300.

34. Yagmur C. Çukurova Üniversitesi öğrencilerinin beslenme durumu üzerine bir araştırma. Beslenme ve Diyet Dergisi 1995; 24: 238-51.

35. Şanlıer N, Arlı M. Üniversitede okuyan ve beslenme eğitimi alan kız öğrencilerin beslenme durumları günlük enerji alımları ve harcamaları. Gazi Beden Eğitimi ve Spor Bilimleri Dergisi 2000; 5: 21-30.

36. Çelik F, Tokgöz P. Dicle Üniversitesi beden eğitimi ve spor bölümünde okuyan öğrencilerin besin tüketim düzeyleri ve beslenme alışkanlıkları. Beslenme ve Diyet Dergisi 1999; 28: 4-9.

37. Hanning RM, Woodruff SJ, Lambraki I, Jessup L, Driezen P, Murphy CC. Nutrient intakes and food consumption patterns among Ontario students in grades six, seven, and eight. Can J Public Health 2007; 98(1): 12-6.

38. Dapi LN, Hörnell A, Janlert U, Stenlund H, Larsson C. Energy and nutrient intakes in relation to sex and socio-economic status among school adolescents in urban Cameroon, Africa. Public Health Nutr 2011; 14(5): 904-13.

39. Satia JA, Galanko JA, Neuhouser ML. Food nutrition label use is associated with demographic, behavioral, and psychosocial factors and dietary intake among African Americans in North Carolina. J Am Diet Assoc 2005; 105: 392-402.

40. Kearney M, Kearney J, Dunne A, Gibney M. Sociodemographic determinants of perceived influences on food choice in a nationally representative sample of Irish adults. Public Health Nutr 1999; 3: 219-226.

41. Topuzoglu A, Hıdıroglu S, Ay P, ve ark. Tüketicilerin gıda ürünleri ile ilgili bilgi düzeyleri ve sağlık risklerine karşı tutumları. TSK Koruyucu Hekimlik Bülteni 2007; 6(4): 253-258.

42. Chang YJ, Lin W, Wong Y. Survey on eating disorder-related thoughts, behaviors, and their relationship with food intake and nutritional status in female high school students in Taiwan. J Am Coll Nutr 2011; 30(1): 39-48.

43. Walsh M, Cartwright L, Corish C, Sugrue S, Wood-Martin R. The body composition, nutritional knowledge, attitudes, behaviors, and future education needs of senior schoolboy rugby players in Ireland. Int J Sport Nutr Exerc Metab 2011; 21(5): 365-376.

44. Gacek M. Eating habits of a group of professional volleyball players. Rocz Panstw Zakl Hig 2011; 62(1): 77-82.