

# The Profile of Healthy Adults in Istanbul Province: Investigation of Dietary Habits and Biochemical Parameters

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**Introduction:** Although the beneficial effects of a healthy diet and increased physical activity are well-known, it is not always easy to follow such a life style. In this study, eating habits and physical activity of the healthy adult population in Istanbul province were investigated.

**Materials and Methods:** A total of 202 subjects who underwent a health check-up program were enrolled in our study. The demographic characteristics and exercise habits of the subjects were recorded. All participants filled out a self-administered questionnaire to determine their dietary profile. Biochemical analysis, complete physical examination, electrocardiogram, and 2-D echocardiography of each subject were performed.

**Results:** The mean age, weight, height, and BMI of the study population were 40.05±11.76 years, 72.9±15.31 kg, 167.6±9.2 cm, and 25.73±5.12 kg/m<sup>2</sup>, respectively. The prevalence of high LDL, TG and low HDL were 32.6%, 40.6% and 49.5%, respectively. Majority (57.9%) of the subjects consumed >5 gr/day salt daily. Only 36.6% of the subjects consumed vegetables more than 3 times a week. 21.3% of the subjects seldom consumed fish. There were relationships between age and fast food consumption ( $\chi^2=34.86$ ;  $p<0.001$ ) and between age and soft drinks ( $\chi^2=26.67$ ;  $p<0.001$ ). Subjects who were doing exercise regularly had lower BMI than the subjects doing exercise irregularly or not at all. There was an inverse relationship between BMI and education level of the subjects. Eating vegetables and fish were associated with better lipid profile; whereas eating red meat and fast food were associated with worse lipid profile.

**Conclusion:** The majority of our study population did not follow healthy eating recommendations. It is imperative to increase the awareness of the public about beneficial effects of diet, healthy eating habits, and lifestyle changes.

**Keywords:** Healty diet, lifestyle, eating habits

## Introduction

One important factor in protection and sustainability of health is assurance of sufficient and well-balanced diet as well as gaining healthy nutrition habits. Due to processes brought by today's conditions, eating habits are

affected and hence various problems arise. One leading problem is progress of chronic illnesses. In recent studies, chronic illnesses such as cardiovascular disease and eating habits have been shown to be correlated (1). Cardiovascular

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disease (CVD) is the leading cause of death for both men and women. In 2015, the number of people who died from CVD was more than 17 million, representing as much as 30 percent of all global deaths, of which 7.4 million were due to coronary artery disease and 6.7 million due to stroke (2). A number of risk factors are related to CVD such as age, sedentary lifestyle, hypertension, hyperlipidemia, smoking, obesity, and diabetes mellitus. Many of the risk factors are modifiable, diet and lifestyle modifications play a crucial role in managing the individual's risk profile. It is well-known that DASH (Dietary Approaches to Stop Hypertension) diet which is rich in vegetables, fruits, low-fat dairy products, whole grains, fish, dietary fibre, potassium and calcium that contains only small amounts of sweets, and sugar containing beverages lower not only the blood pressure in subjects with or without hypertension but also the risk of CVD, coronary heart disease, heart failure and stroke (3, 4). Improved adherence to nonsmoking, healthy dietary patterns, moderate physical activity and alcohol consumption is associated with reduced cardiovascular mortality (5).

While there is a good evidence base for lifestyle interventions involving dietary change and increased physical activity have a positive impact on individuals and communities, it is not always easy to follow a healthy diet. In a world where the unhealthy and processed food readily available, poor eating habits would be heard to change. In this study, we aimed to evaluate lifestyle, eating habits and physical activity of the general adult population in Istanbul province.

### **Materials and Methods**

This study was undertaken between May and September 2018 and a total of 202 subjects who underwent health check-up program were

enrolled. Patients with ischemic heart disease, congestive heart failure, valvular heart disease, hypertension, abnormal ECG, liver rhythm-conduction disorders, disease, cerebrovascular accident, diabetes mellitus, renal dysfunction, and hypo-hyper thyroidism were excluded from the study.

The study was conducted according to the declaration of Helsinki. The study was approved by the ethic committee of Sakarya University (date: 02.04.2018 number: 71522473/050.01.04/65) and the patients gave informed consent prior to participation. Demographics of the population such as age, gender, occupation, educational and income levels were recorded. Body mass index (BMI) in kg/m<sup>2</sup> was calculated from self-reported height and weight. Exercise were classified as never/rarely, occasionally and regularly. All participants filled out self-administered questionnaire to determine their dietary profile. Participants were asked to select one option that represented their average weekly consumption of fruits, vegetables, dairy products, whole grains, red meat, fish, poultry, junk food and high calorie drinks (never/seldom [Group 0], once a week [Group 1], twice a week [Group 2], ≥3 times a week [Group 3]). They were asked about their eating speed, overeating episodes and whether they ate their meals regularly. Eating speed was self-recorded into slow, medium and fast. Overeating was defined as consuming food more than usual or even after feeling satiety. Consumption of spicy food was assessed as never, once a week, more than once a week. Daily coffee intake (none, once a day, 2-3 times a day, more than 3 times a day) and salt consumption (saltless, <5 g/day, 5-10 g/day, ≥10 g/day) were also recorded.

Alcohol consumption was classified as never/seldom, light drinking (at least one serving per

month), moderate drinking (1 serving every day) and heavy drinking (more than 2 serving per day). After an overnight fast blood samples blood samples were collected from antecubital vein: serum total cholesterol (TC), triglyceride (TG), low-density lipoprotein cholesterol (LDL), high density lipoprotein cholesterol (HDL), fasting glucose levels were measured using an chemistry analyzer (COBAS c311, Roche Diagnostics, Germany). Low HDL-C level was defined as <40 mg/ dl, high LDL and TG levels were defined as  $\geq 130$  mg/dl and  $\geq 150$  mg/dl, respectively.

All subjects underwent complete physical examination, 12-lead electrocardiogram, and chest radiography. The 2-dimensional echo cardiographic examinations were performed using Vivid 3 prosystem (GE Vingmed Ultra sound AS, Horten, Norway) according to the recommendations of the American Society of Echocardiography (6).

SPSS (version 20) software programme was used for the data analysis. In order to determine whether the sample was coming from normally distributed population we used Shapiro-Wilk tests. Since data was not normally distributed, we used non-parametric tests. Kruskal-Wallis tests were used for group comparisons, where as sub-group analyses were conducted using Kruskal-Wallis pairwise comparisons test. A p of <0.05 was considered as statistically significant.

## Results

The mean age, weight, height and BMI of the study population were 40.05 years, 72.90 kg, 167.61 cm, and 25.73 kg/m<sup>2</sup>, respectively. All participants had normal electrocardiogram, chest x-ray and 2-D echocardi examination. Clinical and demographic characteristics of the study population are given in Table 1.

**Table 1.** Clinical and demographic characteristics

Parameters	Value
Male / Female	85 (42.1%) / 117 (57.9%)
Age (years)	40.05 (16 - 68 - 18)*
Weight (kg)	72.9 (50 - 120 - 21)*
Height (cm)	167.61 (150 - 192 - 12)*
BMI (kg/m <sup>2</sup> )	25.73 (17 - 43 - 7)*
<b>Smoking</b>	
▪ 0	150 (74.3%)
▪ 1	31 (15.3%)
▪ 2	21 (10.4%)
<b>Alcohol Consumption</b>	
Never/seldom	159 (78.7%)
Light drinking	33 (16.3%)
Moderate drinking	4 (2%)
Heavy drinking	6 (3%)
<b>Heredity</b>	
▪ 0	167 (82.7%) 83,2
▪ 1	35 (17.3%) 16,8
<b>Education</b>	
▪ Elementary	47 (23.3%)
▪ Middle/high	93 (46%)
▪ College	62 (30.7%)
<b>Income Level</b>	
▪ Lower	36 (17.8%)
▪ Middle	126 (62.4%)
▪ Upper	40 (19.8%)
<b>Occupation</b>	
▪ Housewife	48 (23.8%)
▪ Private company	78 (38.6%)
▪ Government officer	15 (7.4%)
▪ Minimal wage	28 (13.9%)
▪ Unemployed	11 (5.4%)
▪ Student	9 (4.5%)
▪ Retired	13 (6.4%)
<b>Marital Status</b>	
▪ Single	56 (27.7%)
▪ Married	129 (63.9%)
▪ Divorced	17 (8.4%)
<b>Exercise Habits</b>	
▪ Never/rarely	48 (23.8%)
▪ Occasionally	94 (46.5%)
▪ Regularly	60 (29.7%)

\*"min"- "max"- "IQR", respectively. 0: Seldom; 1: Once Per Week; 2: Two Times Per Week 3: Times Per Week

Biochemical parameters of the subjects are given in Table 2. The majority of the study subjects ate 3 meals per day and had regular meal patterns. The percentage of slow, normal and fast eaters were 31.2%, 42.6%, and 26.2%, respectively. Participants consumed spicy food (never/seldom: 8.4%, once a week: 36.6%, twice a week: 35.6%, and three times a week: 19.3%). 31.7%, 33.7%, 25.2% and 9.4% of the subjects had overeating episodes never/seldom, once a week, two times a week and three times a week, respectively. Majority of the study population consumed coffee once a day(37.6%), remainder consumed two cups a day (34.1%), 3 cups a day (9.9%), or rarely (18.3%). Salt consumption of the study population were; 18.3%, 23.8%, 38.6% and 19.3% for saltless, normal, salty, too salty, respectively.

**Table 2.** Biochemical parameters of the subjects

Parameter	Mean	Min	Max	IQR
Total cholesterol (mg/dl)	195.94	119	340	50
Triglyceride (mg/dl)	158.58	41	530	92
HDL (mg/dl)	33.38	23	74	13
LDL (mg/dl)	118.74	40	200	53
Fasting glucose (mg/dl)	93.12	68	126	14
RDW (%)	13.96	11	136	1
Hb (g/dl)	14.24	9	17	2
MPV (fl)	9.10	4	16	1
Neutrophil count (10 <sup>3</sup> /mm <sup>3</sup> )	4.69	0	12	2
Lymphocyte count (10 <sup>3</sup> /mm <sup>3</sup> )	2.27	0	5	1

HDL: High Density Lipoprotein Cholesterol, LDL: Low Density Lipoprotein Cholesterol, RDW: Red Cell Distribution Width, Hb: Hemoglobin, MPV; Mean Platelet Volume

**Table 3.** Eating habits of the study population

Parameters	N	%
<b>Number Of Meals</b>		
▪ Once A Day	4	2
▪ Twice A Day	49	24.2
▪ Three Times A Day	140	69.3
▪ Four Times A Day	9	4.5
<b>Regular Meals</b>		
▪ Regular	98	48.5
▪ Mostly Regular	82	40.6
▪ Irregular	22	10.9
<b>Eating Speed</b>		
▪ Slow	63	31.2
▪ Normal	86	42.6
▪ Fast	53	26.2
<b>Overeating Episodes</b>		
▪ Never/Seldom	64	31.7
▪ Once A Week	68	33.7
▪ Twice A Week	51	25.2
▪ Three Times A Week	19	9.4
<b>Spicy Food</b>		
▪ Never/Seldom	17	8.4
▪ Once A Week	74	36.6
▪ Twice A Week	72	35.6
▪ Three Times A Week	39	19.3
<b>Coffee</b>		
▪ Never/Seldom	37	18.3
▪ Once A Day	76	37.6
▪ Twice A Day	69	34.1
▪ Three Times A Day	20	9.9
<b>Salt Consumption</b>		
▪ Saltless	37	18.3
▪ Normal	48	23.8
▪ Salty	78	38.6
▪ Too Salty	39	19.3

Frequency of food types were described as never/seldom, once a week, twice a week, and three times or more than three times a week. The results are shown in Table 3 and 4. We found relationships between age and fast-food consumption (KW(x<sup>2</sup>)=34.86; p<0.001) and between age and soft drinks (KW(x<sup>2</sup>)=26.67; p<0.001); further analysis showed the difference

**Table 4.** Eating habits of the study population

Parameters	N	%
<b>Vegetable</b>		
▪ 0	5	2.5
▪ 1	28	13.9
▪ 2	95	47.0
▪ 3	74	36.6
<b>Fruit</b>		
▪ 0	5	2.5
▪ 1	32	15.8
▪ 2	85	42.1
▪ 3	80	39.6
<b>Whole Grains</b>		
▪ 0	1	0.5
▪ 1	40	19.8
▪ 2	116	57.4
▪ 3	45	22.3
<b>Meat</b>		
▪ 0	29	14.4
▪ 1	87	43.1
▪ 2	55	27.2
▪ 3	31	15.3
<b>Fish</b>		
▪ 0	43	21.3
▪ 1	95	47.0
▪ 2	60	29.7
▪ 3	4	2.0
<b>Poultry</b>		
▪ 0	17	8.4
▪ 1	72	35.6
▪ 2	81	40.1
▪ 3	32	15.8
<b>Dairy Products</b>		
▪ 0	1	0.5
▪ 1	10	5.0
▪ 2	76	37.6
▪ 3	115	56.9
<b>Junk Food</b>		
▪ 0	122	60.4
▪ 1	46	22.8
▪ 2	30	14.9
▪ 3	4	2.0
<b>Soft Drinks</b>		
▪ 0	78	38.6
▪ 1	57	28.2
▪ 2	41	20.3
▪ 3	26	12.9

0: Seldom; 1: Once/Week; 2: 2 Times/Week 3: 3 Times/Week

was made by group 0, indicating that subjects who seldom consumed fast-food and soft drinks had higher average age than the others. There were no significant relationships between fast-food consumption and income level and education of the subjects ( $p=0.256$  and  $p=0.227$ , respectively). Subjects who ate junk food at least 2 times a week had statistically significantly higher TC, LDL and TG than those who seldom consumed such food ( $KW(x^2)=10.07$ ;  $p=0.01$ ,  $KW(x^2)=9.81$ ;  $p=0.02$  and  $KW(x^2)=10.41$ ;  $p=0.01$ , respectively) (Table 5).

The BMI of the participants were differed according to their exercise habits ( $KW(x^2)=50.11$ ;  $p<0.001$ ). Subjects who were doing exercise regularly had lower BMI than the subjects doing exercise irregularly or not at all. There was an inverse relationship between BMI and education level of the subjects ( $KW(x^2)=31.12$ ;  $p<0.001$ ). Subjects who had irregular and fast eating patterns had significantly higher BMI compared to that of the subjects who had regular, mostly regular and slow and normal eating pattern ( $KW(x^2)=7.12$ ;  $p=0.028$  and ( $KW(x^2)=12.11$ ;  $p=0.002$ ). Similarly, BMI who had overeating episodes were higher relative to the subjects who had no overeating episodes ( $KW(x^2)=61.38$ ;  $p<0.001$ ). Eating vegetables more than 3 times a week was associated with lower BMI compared to less frequent consumption ( $KW(x^2)=11.11$ ;  $p=0.025$ ). Further analysis showed that subjects who were eating vegetables more than 3 times a week had lower BMI compared to that of subjects who were eating vegetables only once a week. Subjects who were doing exercise regularly had statistically significantly lower TC and TG levels and higher HDL levels than the subjects who were doing exercise occasionally or rarely ( $KW(x^2)=53.82$ ;  $p<0.001$ ,  $KW(x^2)=42.42$ ;  $p<0.001$

and  $KW(x^2)=13.31$ ;  $p=0.004$ , respectively). Eating vegetables at least 3 times/week was associated with lower TC and LDL ( $KW(x^2)=37.48$ ;  $p<0.001$ ,  $KW(x^2)=45.02$ ;  $p<0.001$  and  $KW(x^2)=20.97$ ;  $p<0.001$ , respectively). Participants who ate red meat more than 2 times a week had significantly higher TC and LDL levels than that of the participants who consume less amount of meat ( $KW(x^2)=25.94$ ;  $p<0.001$  and  $KW(x^2)=39.25$ ;  $p<0.001$ , respectively). On the contrary, eating fish more than once a week was associated with lower TC, LDL and TG levels ( $KW(x^2)=24.31$ ;  $p<0.001$ ,  $KW(x^2)=19.52$ ;  $p<0.001$  and  $KW(x^2)=13.96$ ;  $p=0.003$ , respectively). The increased number of overeating episodes was correlated with higher LDL levels ( $KW(x^2)=85.97$ ;  $p<0.001$ ). The pairwise analysis demonstrated that the difference was significant between all groups except between subjects who had overeating episode once a week (Group 1) and twice a week (Group 2). Overeating episodes were also

associated with increased glucose levels ( $KW(x^2)=55.94$ ;  $p<0.001$ ). Further analysis showed that the difference was between all groups except between subjects who had overeating episodes once and twice weekly. When we analyzed the glucose levels of the participants, we found that participants who were doing exercise regularly had lower glucose levels than the participants who were not doing exercise regularly or not at all ( $KW(x^2)=56.53$ ;  $p<0.001$ ). Table 6 shows the comparison of the eating habits of the subjects with other parameters. There was an association between TG levels and alcohol consumption. ( $KW(x^2)=10.65$ ;  $p<0.014$ ). Heavy drinkers had higher TG levels compared to light and seldom drinkers. It was found that as the salt intake increases, the TC also increases  $KW(x^2)=44.66$ ;  $p<0.001$ ). Further analysis showed that the difference was significant between all groups, except between group 0 (saltless consumer) and 1 (normal salt consumer).

**Table 5.** Comparison of fast food and soft drink consumption with other parameters

Fast Food Consumption					
Variables	Seldom	Once a week	Two times a week	Three times a week	p
Age (years)	43.95	35.93	18.01	27.5	$p<0.001$
TC (mg/dl)	199.4	207.34	226.03	238.25	$p=0.01$
LDL (mg/dl)	123.56	135.15	144.9	142.25	$p=0.02$
TG (mg/dl)	164.07	198.21	221.6	224.25	$p=0.01$
Income Level (n)					
Lower	28	4	4	0	$p=0.256$
Middle	71	31	20	4	
Upper	23	11	6	0	
Education (n)					
Elementary/middle/high	91	28	19	2	$p=0.227$
College	31	18	11	2	
Soft Drink Consumption					
Age (years)	44.6	40.08	36.9	31.34	$p<0.001$

LDL: Low density cholesterol, TC: Total cholesterol, TG: Triglyceride

**Table 6.** Comparison of eating habits and education of the subjects with other parameters

Exercise Habits	Never/rarely	Occasionally	Regularly		P Value
BMI (kg/m <sup>2</sup> )	30.66	28.50	25.68		p<0.001
TC (mg/dl)	233.29	210.25	177.3		p<0.001
TG (mg/dl)	235.89	189.14	126.29		p<0.001
HDL(mg/dl)	40.83	42.39	46.98		p=0.004
Glucose (mg/dl)	98.85	93.41	87.3		p<0.001
Education	Elementary	Middle/High	College		
BMI (kg/m <sup>2</sup> )	29.88	28.46	24.90		p<0.001
Regular Meals	Irregular	Mostly Regular	Regular		
BMI (kg/m <sup>2</sup> )	27.43	26.14	25.12		p=0.028
Eating Speed	Slow	Normal	Fast		
BMI (kg/m <sup>2</sup> )	26.59	27.13	30.07		p=0.002
Overating Episodes	Never/Seldom	Once a Week	Twice a Week	Three Times a Week	P Value
BMI (kg/m <sup>2</sup> )	24.79	27.12	29.31	35.56	p<0.001
LDL(mg/dl)	102.89	128.94	143.19	186.94	p<0.001
Glucose (mg/dl)	87.32	93.69	95.53	104.10	p<0.001
Vegetables					
BMI (kg/m <sup>2</sup> )	27.51	29.73	28.71	25.94	p=0.025
TC (mg/dl)	221.52	220.85	221.07	182.04	p<0.001
LDL(mg/dl)	140.25	148.21	141.85	108.33	p<0.001
Red Meat					
TC (mg/dl)	186.89	194.29	215.89	238.77	p<0.001
LDL(mg/dl)	111.10	119.31	139.05	159.93	p<0.001
Fish					
TC (mg/dl)	221.67	212.98	185.95	169.25	p<0.001
LDL(mg/dl)	138.65	136.66	113.53	112.75	p<0.001
TG (mg/dl)	198.51	196.55	149.58	124	p=0.003

BMI: Body mass index, HDL: High density cholesterol, LDL: Low density cholesterol, TC: Total cholesterol, TG: Triglyceride

## Discussion

Our study provides important insights about the dietary habits of the adult population in Turkey. It also gives information on how dietary habits of the subjects affected their biochemical parameters. Most of the subjects had three main meals per day, regular meal pattern and normal eating speed. The majority consumed salty or too salty food, drank coffee once a day and had overeating episodes at least once per week. The average BMI of the sample was  $25.73 \pm 5.12$

kg/m<sup>2</sup>, indicating overweight. Eating vegetables and red meat was found to be related better and worse lipid profiles, respectively. Subjects who had high consumption of fish had better blood lipid levels.

Obesity and overweight are growing public problems with serious medical consequences such as diabetes mellitus, hypertension and cardiovascular disease, sleep apnea (7, 8). Over the past four decades, the prevalence of obesity in the world has doubled, with a higher rate

of increase in childhood obesity (9). According to Turkish Health Ministry, BMI of the Turkish adult population was 26.6 kg/m<sup>2</sup> (women: 26.8 kg/m<sup>2</sup>, men: 26.1 kg/m<sup>2</sup>) (10). A high prevalence of high-LDL, TG and low HDL (29.1%, 36.5% and 46.1%, respectively) have been reported in our country which remains a major health concern for cardiovascular diseases (11). In our study, the prevalence of high LDL, TG and low HDL were 32.6%, 40.6% and 49.5%, respectively. Our results were in agreement with the above-mentioned results, emphasizing the importance of life style changes for better overall health.

Several studies have found a clear association between lower socioeconomic and educational level and high BMI in developed countries (12-14). This may be due to the characteristics of local food environment, less consumption of fruits and vegetables and prices of the food (15). The reverse may be true; for example, higher BMI might be related to lower self-esteem, weaker job prospects, lower income and educational levels (16, 17). However studies performed in developing countries showed just the opposite; thus reflecting the changes in eating habits and occupational patterns (18, 19). According to Turkish Health Ministry data prevalence of obesity was the highest among people with no education (10). Similarly in our study, we found an inverse relation between BMI and education. Our results have shown, one more time, the pivotal role of education for healthy diet and life.

Eating frequency has been offered as one of the factors which influence BMI. However studies conducted on this topic revealed conflicting results. EPIC project and SEASONS study showed higher eating frequency was associated with lower LDL and obesity risk even after adjustment for confounding factors (20,

21). 16-year follow up study indicated that eating one or two times a day increased the risk of type II diabetes compared to more frequent eating (22). Conversely, other studies reported lower BMI in subjects who ate less frequently and had long overnight fast (23, 24). BMI is appeared to be affected by eating time. Eating in a short time lower the response to the satiety hormones, resulting in overeating, high calorie intake and insulin resistance (25,26). We did not find any association between number of meals and BMI of the subjects. However, subjects who had regular meals and slow eaters had lower BMI compared to subjects who had irregular meals and fast eaters.

Much evidence showed that high salt intake is a key factor for developing high blood pressure (27). The World Health Organization (WHO) proposed reduced salt intake as a cost-effective and practical way of reducing cardiovascular disease prevalence (28). Although salt consumption in Turkey has decreased in recent decades, it is still high and has been reported as 14.8 gr/day (29). Bread represented the main source of salt, followed by the salt added during cooking, prepackaged food and the salt added after cooking (29). More than half of the study population consumed salt >5 gr/day, emphasizing the importance of raising the awareness of population about consumption of salt and its effects on health.

Less intake of fruits and vegetables has been linked to various chronic diseases, namely, cardiovascular diseases, diabetes mellitus and some kinds of cancer (30). WHO recommends 400 gr or five portions of fruit and vegetable intake every day (31). The fruit and vegetable consumption of our study group was lower than the recommended level substantially.



Excess red meat intake has been found to be related to various diseases (diabetes, stroke, cardiovascular diseases, cancer) and increased mortality (32). There has been several studies regarding the effect of red meat intake on blood cholesterol. Results of these studies showed that processed meat and fatty meat, not lean red meat, had adverse effects on serum TC and LDL levels because of their high saturated fatty acid content (33). In the present study, we only asked our target population about their red meat consumption, we did not ask whether it was processed meat, fatty meat or lean red meat. Probably because of that we found significant associations between red meat consumption and blood cholesterol and LDL levels. As expected, consuming a diet rich in fish and vegetables was associated with better blood lipid profile. Junk food, because of its lower cost and easy availability, has been preferred especially by younger population. Since its high saturated fat and glycemic index, it has deleterious effects on blood lipid and glucose profile (34). In our study, fast-food and soft drinks were preferred by young subjects, but we did not find any relationship between fast food consumption and socioeconomic status or education levels of the subjects.

The US Dietary Guidelines Advisory Committee has recommended at least 2 servings of sea food per week as a part of healthy and balanced diet, since it is a good source of proteins, vitamins and long chain n-3 polyunsaturated fatty acids (35). Fish intake of our population is far less than the expected, although Turkey has surrounded by 4 seas. Almost one fifth of our study population consumed fish seldom and only one third of the subjects consumed at least twice per week. With the given health benefits

of fish consumption, it is one of the major public health concern in Turkey.

### Conclusion

In conclusion, adopting healthy diet and lifestyle changes are crucial for maintenance of health. Majority of our study population did not follow healthy eating recommendations. As in other countries, obesity and overweight are becoming an increasing problem in our country. Public campaigns and activities should be implemented, aimed at awareness of people about the fabulous benefits of healthy diet, healthy eating habits and lifestyle changes.

### Ethical Statement

The study was conducted according to the declaration of Helsinki. The study was approved by the ethic committee of Sakarya University (date: 02.04.2018 number: 71522473/050.01.04/65) and the patients gave informed consent prior to participation.

### Conflicts of Interest

The authors declared no conflict of interest.

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