Original Article

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Research of Nutritional Behavior in Patients with Gastroesophageal Reflux

Gastroözofageal Reflü Hastalarında Beslenme Davranışının Araştırılması

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ABSTRACT

Objective: Gastroesophageal reflux (GER) is the migration of stomach contents to the lower part of the oesophagus, which is a physiological phenomenon that can usually be detected 10-15 times a day. It can occur after meals and during sleep. This study was conducted to investigate the nutritional behaviour of patients diagnosed as having GER disease (GERD).

Methods: In this research, among patients who were admitted to the gastroenterology outpatient clinic in a training and research hospital in İstanbul between June and December 2019, 104 patients aged 18-65 and diagnosed as having GERD as the study group, and 104 individuals not diagnosed as having GERD as the control group were included.

Results: Of both patient and control groups, 49% were male and 51% were female. It was determined that those diagnosed as having the disease frequently experienced pyrosis and regurgitation with acidity. The average body mass index (BMI) of the patient group was 30.40 kg/m^2, and of the control group, it was 25.41 kg/m^2 ($p<0.05$). In this study, nutritional habits were assessed, and statistically significant variations were found in the number of meals, meal skipping, eating speeds, and food temperatures. It was determined that most people with GERD symptoms ate more chocolate, fatty foods, acidic foods, spicy foods, and sodas than the control group. It was found that most individuals diagnosed as having GERD were overweight and their physical activities were significantly lower than the control group ($p<0.05$).

ÖZ

Amaç: Gastroözofageal reflü (GÖR), mide içeriğinin özefagusun alt kısmına doğru hareketi olup normalde günde 10-15 kez gözlenebilen fizyolojik bir olaydır. Bu durum yemekten sonra ve uyku sırasında oluşabilmektedir. Bu çalışma GÖR hastalığı (GÖRH) tanısı almış hastaların beslenme davranışının araştırılması amacıyla yapılmıştır.

Yöntemler: Bu çalışmada İstanbul'da bir eğitim ve araştırma hastanesinde gastroenteroloji polikliniğine Haziran-Aralık 2019 tarihleri arasında başvuran hastalardan GÖRH tanısı alan, yaşları 18-65 arasında değişen 104 hasta ve kontrol grubu olarak GÖRH tanısı almayan 104 birey seçilmiştir.

Bulgular: Hasta ve kontrol grubunun %49'u erkek ve %51'i kadındır. Hastalık tanısı alanların sıklıkla pirozis ve asit regürjitasyonu yaşadıkları belirlenmiştir. GÖRH tanısı konulan bireylerin beden kitle indeksi (BKİ) ortalamasının 30,40 kg/m^2, kontrol grubundaki bireylerin BKİ ortalamasının 25,41 kg/m^2 olduğu tespit edilmiştir ($p<0,05$). Bu çalışmada bireylerin beslenme alışkanlıkları değerlendirilmiş ve öğün sayısı, öğün atlama durumu, yemek yeme hızları, yemek ısıları açısından istatistiksel olarak anlamlı farklılıklar bulunmuştur. GÖRH semptomları yaşayan bireylerin büyük çoğunluğunun reflüjenik besinler olan çikolata, yağlı besinler, asitli besinler, baharatlar ve kolalı içecekleri kontrol grubuna göre daha çok tükettikleri saptanmıştır. GÖRH tanısı alan bireylerin çoğunluğunun fazla kilolu olduğu, fiziksel aktivitelerinin kontrol grubuna göre anlamlı derecede düşük olduğu tespit edilmiştir ($p<0,05$).

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Conclusion: As a result, the improvement in feeding behaviour and reducing the BMI level to acceptable limits would minimize the incidence of GER.

Keywords: Gastroesophageal reflux, nutritional behaviour, nutritional assessment

Sonuç: Sonuç olarak, beslenme alışkanlıklarındaki değişimin ve BKİ düzeyinin normal sınırlara getirilmesinin GÖR oluşumunu azaltacağı kanaatine varılmıştır.

Anahtar Sözcükler: Gastroözofageal reflü, beslenme davranışı, beslenme değerlendirmesi

Introduction

Gastroesophageal reflux (GER) is a physiological phenomenon which is the migration of stomach contents to the lower part of the esophagus, that can usually be detected 10-15 times a day (1). This physiological condition is short-lived and does not give any symptoms. However, if there is a more severe and prolonged reflux, then there are different signs. In this case, GER disease (GERD) is mentioned (2,3). The most common symptoms of GERD are pyrosis and regurgitation (4). Other symptoms are bloating, feeling of fullness in the stomach, chest pain, difficulty swallowing, cough, and hoarseness (2). In endoscopy, pathological findings are seen in just 30-40% of patients with GER, and no pathological findings are seen in the endoscopy of the remaining (5). Complications such as erosive esophagitis, esophageal stricture, Barrett's esophagus and cancer of the esophagus can be seen in endoscopy, depending on the duration and intensity of the symptoms (2,5).

The prevalence of GERD in the world varies between 7-25%. While it is between 10-20% in Europe and America, it is 2.5-7.8% in East Asian countries and 11.6% in Australia. In our country, GERD frequency is between 10-20%, as in Western countries (1,6). The prevalences of Obesity and GERD have dramatically increased in western societies over the last 40 years. Obesity is an important factor in the occurrence of GERD (7). Obesity promotes GERD development by increasing the intragastric pressure and reducing the lower esophageal sphincter (LES) pressure (8,9).

The gradual increase of GERD symptoms in the population shows that it is important to determine the risk factors for this disease. Studies have shown that reducing obesity, maintaining a healthy diet, and avoiding pests such as smoking, and alcohol are important for GERD development and treatment (10). The purpose of this study is to determine the anthropometric measurements and general features and nutritional status of GERD-diagnosed individuals.

Methods

This study was conducted between June and December 2019 in patients diagnosed as having GERD among those who presented to the İstanbul Okan University Gastroenterology Outpatient Clinic and Nutrition and Dietetics. A total of 104 patients, 53 females and 51 males, diagnosed as having GERD, aged between 18-65 were included in the study. In addition, 104 patients without GERD symptoms were taken as the control group. The survey form used for patients (study group) and control group in the study was prepared by the researchers from a literature review for similar studies (10).

The "Ethics Committee Approval" dated 13 March 2019, numbered 104, was obtained from the İstanbul Okan University Ethics Committee for the survey study. The research was launched with the approval of İstanbul Okan University on May 28, 2019, with the permission of Nutrition and Dietetics. The individuals included in the study read and signed the informed volunteer consent form which was signed by the researcher, and a copy was delivered to them.

Questionnaire Form

Descriptive information (age, education level, occupation, and bad habits such as smoking and alcohol) was asked in the first part of the questionnaire applied to the participants. Additionally, participants were asked whether there were signs of GERD, the length and frequency of symptoms in patients with symptoms, and whether their families had GERD. The nutritional habits of the patients were questioned in the survey. The daily physical activity status of the patients was questioned.

Anthropometric Measurements

The body mass index (BMI) is determined by calculating the body weight and height of all the questionnaire participants. BMI is calculated as kg/m^2 using the body weight (kg)/height (m^2) formula. It is graded according to World Health Organization's BMI classification data (11).

Statistical Analysis

All data were evaluated using the SPSS 22.0 Statistics Program. First, during the evaluation of the study results, descriptive statistics (mean, standard deviation, minimum, maximum) were clarified for the numerical variables. To settle on the required form of analysis, it was then evaluated whether the data met the usual requirements of distribution. Since the collected data provided the normal distribution conditions, it was decided to apply parametric analysis methods. In this context, two independent samples t-test was used to show whether there was a difference between the two groups (e.g., study and control groups). Significance in the analysis was evaluated at the level of $p<0.05$ (12).

Results

Demographic variables of the individuals participating in the study are given in Table 1. When the gender distribution was analysed, it was shown that roughly half of the sample consisted of women and the other half consisted of men, and the study and control groups had similar distribution.

When analysing the educational status of the individuals taking part in the study, it was shown that 43.75% of them were high school graduates, 29.33% were university graduates, and

Table 1. Distribution by demographic variables

		Study n=104		Control n=104		Total n=104	
		n	%	n	%	n	%
Age	18-24	8	7.69	6	5.77	14	6.73
	25-32	18	17.31	23	22.12	41	19.71
	33-40	16	15.38	29	27.88	45	21.63
	41-48	27	25.96	23	22.12	50	24.04
	48-65	35	33.65	23	22.12	58	27.88
Gender	Male	51	49.04	51	49.04	102	49.04
	Female	53	50.96	53	50.96	106	50.96
Educational status	Illiterate	7	6.73	0.00	0.00	7	3.37
	Primary school	24	23.08	1	0.96	25	12.02
	Secondary school	16	15.38	6	5.77	22	10.58
	High school	26	25.00	65	62.50	91	43.75
	University	29	27.88	32	30.77	61	29.33
	Master's degree	2	1.92	0.00	0.00	2	0.96
Occupational status	Housewife	34	32.69	8	7.69	42	20.19
	Officer	11	10.58	18	17.31	29	13.94
	Worker	25	24.04	74	71.15	99	47.60
	Self-employment	11	10.58	1	0.96	12	5.77
	Other	23	22.12	3	2.88	26	12.50
	Total	104	100	104	100	104	100

the remaining part did not attend secondary or primary school or kindergarten. It was seen that 47.6% of the individuals participating in the study were workers. Looking at the study population directly, it was shown that 32.69% of refluxed patients were housewives and 24.04% were workers. In the control group, the rate of housewives was 7.69% and the rate of workers was 71.15%.

While the individuals in the study group involved in the study had an average BMI of 30.40, the individuals in the control group had an average BMI of 25.41, and a statistically significant difference was observed between the experimental and control groups ($p<0.05$).

In this study, the smoking rate in the experimental group was 49.04%, while it was 36.54% in the control group. While in the study group, the smoking period was 13.9 years, in the control group it was 12.1 years ($p>0.05$). The alcohol intake rate in the study group was 20.19%, while in the control group it was 1.92% ($p<0.05$). While the duration of alcohol consumption of individuals in the study group was 7.1 years, the duration of alcohol consumption of individuals in the control group was 6 years ($p>0.05$).

It was investigated whether there was a substantial difference in terms of the family history between the individuals in the study and control groups, and it was found that 57 of the individuals in the study group had reflux symptoms in the family, and that 5 of those in the control group had reflux symptoms in the family ($p<0.05$). Although only 29.81% of the individuals in the study group reported engaging in physical activity, this figure was 67.31% for the control group ($p<0.05$).

In this study, it was found that the control group had more main and snack meals than the study group. While the number of people fed with 4 meals a day in the study group was 35.58%, this rate was 63.46% in the control group, and the number of people fed with 5 meals a day was 7.69% in the study group and 19.23% in the control group ($p<0.05$). When the eating style was questioned, it was determined that 62.50% of the individuals in the study group and 12.5% of the individuals in the control group ate fast/very fast ($p<0.05$). Of the individuals in the study group 60.58% and 28.85% of the individuals in the control group ate hot/very hot food ($p<0.05$).

In this study, it was found that 31.73% of the individuals in the study group ate before going to bed at night, and this rate was 5.77% in the control group ($p<0.05$).

The t-test results regarding the frequency of consuming fatty foods of the individuals participating in the study are given in Table 2. The consumption of whole milk, creamy yoghurt and kashar cheese from the fatty food group was examined. It was found that 22.1% of the individuals in the study group drank whole milk, 27.9% ate creamy yogurt and 30.8% ate kashar cheese every day. It was determined in the control group that these foods were not eaten regularly, 9.6% drank whole milk 4-5 days a week, 13.5% consumed creamed yogurt and 1% consumed kashar ($p<0.05$).

Table 2. Results by frequency of eating fatty foods

	The frequency of consumption of foods	Never		Once a month		Once in every 15 days		Once per week		2-3 times per week		4-5 times per week		Every day		t-value*	p-value
	Food & drink	n	%	n	%	n	%	n	%	n	%	n	%	n	%		
Study group	Milk (whole milk)	24	23.1	3	2.9	1	1.0	5	4.8	19	18.3	29	27.9	23	22.1	11.651	0.000
	Yoghurt (with cream)	4	3.8	2	1.9	1	1.0	6	5.8	19	18.3	43	41.3	29	27.9		
	Kashar cheese	22	21.2	7	6.7	2	1.9	12	11.5	8	7.7	21	20.2	32	30.8		
	Margarine	81	77.9	7	6.7	0.00	0.0	4	3.8	3	2.9	6	5.8	3	2.9		
	Butter	9	8.7	3	2.9	2	1.9	9	8.7	11	10.6	7	6.7	63	60.6		
Control group	Milk (whole milk)	11	10.6	23	22.1	17	16.3	31	29.8	12	11.5	10	9.6	0.00	0.0		
	Yoghurt (with cream)	4	3.8	9	8.7	20	19.2	36	34.6	21	20.2	14	13.5	0.00	0.0		
	Kashar cheese	95	91.3	2	1.9	2	1.9	0.00	0.0	3	2.9	1	1.0	1	1.0		
	Margarine	101	97.1	1	1.0	0.00	0.0	1	1.0	0.00	0.0	0.00	0.0	1	1.0		
	Butter	19	18.3%	3	2.9	0.00	0.0	4	3.8	8	7.7	2	1.9	68	65.4		

p<0.05 is statistically significant.
*t-test

Table 3. Results of the frequency of consuming acidic foods

		Never		Once a month		Once in every 15 days		Once per week		2-3 times per week		4 - 5 times per week		Every day		t-value*	p-value
	Food & drink	n	%	n	%	n	%	n	%	n	%	n	%	n	%		
Study group	Tomato	1	1.0	0.00	0.0	0.00	0.0	2	1.9	7	6.7	11	10.6	83	79.8	19.569	0.000
	Onion	2	1.9	0.00	0.0	1	1.0	2	1.9	6	5.8	10	9.6	83	79.8		
	Garlic	9	8.7	4	3.8	4	3.8	18	17.3	26	25.0	20	19.2	23	22.1		
	Pickle	16	15.4	14	13.5	8	7.7	11	10.6	28	26.9	22	21.2	5	4.8		
	Citrus fruits	17	16.3	4	3.8	5	4.8	14	13.5	16	15.4	18	17.3	30	28.8		
	Tomato paste	3	2.9	0.00	0.0	1	1.0	5	4.8	10	9.6	10	9.6	75	72.1		
Control group	Tomato	0.00	0.0	0.00	0.0	2	1.9	90	86.5	12	11.5	0.00	0.0	0.00	0.0		
	Onion	3	2.9	0.00	0.0	5	4.8	90	86.5	6	5.8	0.00	0.0	0.00	0.0		
	Garlic	64	61.5	10	9.6	17	16.3	10	9.6	3	2.9	0.00	0.0	0.00	0.0		
	Pickle	60	57.7	14	13.5	10	9.6	17	16.3	2	1.9	0.00	0.0	1	1.0		
	Citrus fruits	11	10.6	1	1.0	8	7.7	62	59.6	20	19.2	0.00	0.0	2	1.9		
	Tomato paste	12	11.5	1	1.0	2	1.9	4	3.8	4	3.8	1	1.0	80	76.9		

p<0.05 is statistically significant.
*t-test

Table 4. Results of the frequency of eating sugar group foods

		Never		Once a month		Once in every 15 days		Once per week		2-3 times per week		4 - 5 times per week		Every day		t-value*	p-value
	Food & drink	n	%	n	%	n	%	n	%	n	%	n	%	n	%		
Study group	Sugar	25	24.0	5	4.8	4	3.8	2	1.9	5	4.8	10	9.6	53	51.0	7.991	0.000
	Honey/jam/molasses	12	11.5	8	7.7	7	6.7	8	7.7	22	21.2	12	11.5	35	33.7		
	Chocolate	12	11.5	6	5.8	3	2.9	14	13.5	16	15.4	22	21.2	31	29.8		
	Deserts with syrup	20	19.2	18	17.3	13	12.5	19	18.3	29	27.9	4	3.8	1	1.0		
	Milky desserts	20	19.2	16	15.4	10	9.6	29	27.9	25	24.0	3	2.9	1	1.0		
Control group	Sugar	23	22.1	20	19.2	20	19.2	15	14.4	3	2.9	1	1.0	22	21.2		
	Honey/jam/molasses	14	13.5	30	28.8	17	16.3	31	29.8	3	2.9	2	1.9	7	6.7		
	Chocolate	11	10.6	5	4.8	14	13.5	45	43.3	25	24.0	1	1.0	3	2.9		
	Deserts with syrup	25	24.0	58	55.8	14	13.5	7	6.7	0.00	0.0	0.00	0.0	0.00	0.0		
	Milky desserts	12	11.5	36	34.6	45	43.3	10	9.6	1	1.0	0.00	0.0	0.00	0.0		

p<0.05 is statistically significant.
*t-test

Table 5. Results on the frequency of consuming acidic and non-acidic beverage group foods

		Never		Once a month		Once in every 15 days		Once per week		2-3 times per week		4 - 5 times per week		Every day		t-value*	p-value
	Food & drink	n	%	n	%	n	%	n	%	n	%	n	%	n	%		
Study group	Water	1	1.0	0.00	0.0	0.00	0.0	0.00	0.0	1	1.0	0.00	0.0	102	98.1	8.576	0.000
	Tea	4	3.8	1	1.0	0.00	0.0	0.00	0.0	3	2.9	2	1.9	94	90.4		
	Herbal teas	69	66.3	7	6.7	2	1.9	4	3.8	6	5.8	4	3.8	12	11.5		
	Turkish coffee	19	18.3	2	1.9	0.00	0.0	3	2.9	9	8.7	5	4.8	66	63.5		
	Nescafe	67	64.4	4	3.8	4	3.8	5	4.8	8	7.7	4	3.8	12	11.5		
	Sodas	40	38.5	8	7.7	3	2.9	9	8.7	11	10.6	19	18.3	14	13.5		
	Mineral water	28	26.9	3	2.9	6	5.8	4	3.8	20	19.2	26	25.0	17	16.3		
Control group	Water	1	1.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	103	99.0		
	Tea	2	1.9	0.00	0.0	0.00	0.0	0.00	0.0	1	1.0	1	1.0	100	96.2		
	Herbal teas	86	82.7	0.00	0.0	0.00	0.0	4	3.8	6	5.8	2	1.9	6	5.8		
	Turkish coffee	9	8.7	1	1.0	4	3.8	39	37.5	17	16.3	4	3.8	30	28.8		
	Nescafe	88	84.6	2	1.9	0.00	0.0	4	3.8	1	1.0	0.00	0.0	9	8.7		
	Sodas	26	25.0	16	15.4	42	40.4	17	16.3	1	1.0	1	1.0	1	1.0		
	Mineral water	39	37.5	19	18.3	33	31.7	8	7.7	2	1.9	1	1.0	2	1.9		

p<0.05 is statistically significant.
*t-test

The t-test results regarding the frequency of consuming fatty foods of the individuals participating in the study are given in Table 3. In the study group, tomato and onion were eaten daily at a rate of 79.8%, garlic 22.1%, pickle 4.8% and citrus 28.8%. In the control group, the daily consumption of these foods was 0% or was close to 0% and taking into account consumption rates 2-3 times a week, the rates were as follows: tomatoes 11.5%, onion 5.8%, garlic 2.9%, pickle 1.9%, and citrus fruits 19.2% ($p<0.05$).

In this study, eating frequency and spice consumption of fried foods were examined. Although 23.1% of the study group consumed French fries 2-3 times a week and 14.4% of the study group consumed other fried vegetables, these amounts were 3.8% and 2.9% respectively in the control group ($p<0.05$). While the daily consumption of peppermint/red pepper/black pepper in the study group was 67.3%, it was 0% in the control group. It was determined that 2-3 times a week the control group consumed the spice group at a rate of 11.5% ($p<0.05$).

The t-test results regarding the frequency of consuming fatty foods of the individuals participating in the study are given in Table 4. It was found that daily sugar consumption was 51%, daily honey/jam/syrup consumption was %33.7, daily chocolate consumption was %29.8, the consumption of desserts with syrup 2-3 times per week was 27.9 %, milky dessert eating percentage was 24%; whereas in the control group daily sugar consumption rate was 21%, honey/jam/syrup consumption was 6.7%, chocolate consumption was 2.9%, the consumption of desserts with syrup 2-3 times was 0%, and the consumption of milky sweet was 1% ($p<0.05$).

The t-test results regarding the frequency of consuming fatty foods of the individuals participating in the study are given in Table 5. While the rates of daily consumption of Turkish coffee, soda and mineral water were found 63.5%, 13.5% and 16.3%, respectively in the study group; these rates were 28.8%, 1% and 1.9%, respectively in the control group.

Discussion

The GERD is an important health problem in the world. In the world, this disease is seen between 7-25% and in western countries this prevalence is between 10-20% (13). In Turkey, frequency of GERD is observed similar with the frequency in the West (1).

If GERD is not treated, complications such as esophagitis, esophageal stricture, Barett's esophagus and adenocarcinoma of the esophagus may develop. As a result of studies, it is thought that factors such as eating habits and lifestyle play an important role in the etiology of the disease (3,10).

The best determined risk factors for GERD are malnutrition, obesity and advanced age (1). It is known that the age factor is effective in the frequency of GERD (14). In that analysis, the average age of GER patients was estimated to be older than control group. In a study conducted to examine the incidence of GERD in Taiwan, it was found that the risk of developing GERD was higher in the 40-49 and 50-59 age groups (15). In their research, Moshkowitz et al. (16) noted that GERD symptoms were more frequent over the age of 35, and GERD was more frequent at an average age of 44±14 years. In this study, it was found that GERD was more common in the 41-48 and 49-60 age groups.

Eco-factors such as physical activity and obesity are known to play a role in GERD. It has been reported in studies that moderate physical activity has a protective effect against GERD (17,18). In this study, in the control group, the rate of moderate activity (brisk walking) was 67.31% , while in the study group, this rate was 29.81% ($p<0.05$).

The prevalence of obesity increases significantly in many parts of the world, and this situation leads to many diseases. Obesity facilitates the formation of GERD by causing an increase in intraabdominal pressure, delay in gastric emptying and a decrease in LES pressure (19). In Korea, Song et al. (20) examined the relationship between BMI and GERD. They found that the risk of obese individuals for GERD increased 2.5 times compared to healthy individuals. Murray et al. (21) reported that the frequency of heartburn increased 2.91 times and acid regurgitation increased 2.23 times in obese individuals compared to normal weight individuals. Ayazi et al. (22) reported that the rate of regurgitation was higher in people with higher BMI values than with normal BMI values. In a study conducted in Sweden, it was stated that individuals with BMI >30 kg/m^2 had a higher risk of GERD compared to individuals with normal weight (BMI: 20-25 kg/m^2) (23). In this study, the mean BMI of individuals diagnosed as having GERD was found to be 30.40, and the mean BMI of the control group was found to be 25.41. This result shows that the increase in BMI increases the risk of developing GERD.

It was stated that smoking, the number of cigarettes smoked, and the duration of smoking were important risk factors for GERD, and in a study, the risk of developing GERD increased by 1.7 times in individuals who smoked compared to non-smokers (24). In this study, the smoking rates between the two groups were not statistically significant due to the high rate of smoking in both the study group and the control group ($p>0.05$). For this reason, we cannot express an opinion on the relationship between smoking and GERD according to our study.

Alcohol use is a risk factor for GERD as it damages the gastric mucosal barrier. The incidence of GERD was found 2.5 times higher in 2,000 alcohol users in Poland compared to the control group (25). Mohammed et al. (26) conducted a survey in 1,533 people and reported that the risk of GERD symptoms in men with excessive alcohol use (30 units/week) increased 2.96 times. In this study, the rate of alcohol consumption in the study group was found to be higher than the control group ($p<0.05$). As a result, we can say that GERD symptoms are more common in people who use alcohol.

It has been stated that genetic factors play a role in the etiopathogenesis of GERD (1). This situation was also observed

in this study. It was found that the rate of reflux symptoms in the family of individuals in the study group was higher than the control group ($p<0.05$).

Number of meals reflects the size of the portion of the food eaten at a meal. The excess amount of food taken in a meal causes distension in the stomach and prolongs the time of food leaving the stomach. As a result, the delay in gastric emptying rate facilitates the relaxation of the LES and leads to reflux. This situation will lead to the GERD. If snacks are included between 3 main meals, the portion in the meal will decrease. This will reduce the incidence of GERD symptoms (27). In this study, it was observed that the individuals in the control group had more main and snack meals compared to the study group ($p<0.05$).

In this study, it was found that the individuals in the experimental group skipped more meals. According to these results, it is understood that the number of meals of the individuals in the study group is lower and their portions in a meal are larger.

In this study, it was determined that 62.50% of the individuals in the study group and 12.5% of the individuals in the control group ate food fast / very fast. If food is eaten fast / very fast, the stomach fills up quickly and the pressure in the stomach increases by stretching, thus causing reflux (28). In a study conducted by Wildi et al. (29), 20 healthy individuals were asked to consume a meal in 5 minutes, and it was found that reflux was experienced 14 times in two hours after the meal consumed in 5 minutes. This suggests that eating food fast may pose a risk for GERD.

In this study, it was determined that 60.58% of the individuals in the study group and 28.85% of the individuals in the control group ate hot/very hot food. Very hot meals cause erosion in the stomach and increase the acid secretion, thus facilitating the formation of GERD (30).

In this study, it was determined that 31.73% of the individuals in the study group ate before going to bed at night, while 5.77% of the individuals in the control group ate before going to bed at night. In a study conducted in İzmir, this situation was found to be 45.3% in the patient group (10). We can say that eating before going to bed at night facilitates the formation of GERD.

In this study, we compared the foods frequently consumed by the study group with the control group. As a result, it was found that the individuals in the study group consumed more fatty foods than the individuals in the control group ($p<0.05$). Studies have found that the frequency of GERD increases after high-fat meals (31,32). In another study, it was found that the total fat in the diets of GERD patients was high (33). Dibley et al. (34) reported that fatty milk and dairy products increased GERD symptoms.

In this study, the frequency of eating acidic foods was investigated. It was found that the individuals in the study group consumed these foods more frequently than the control group ($p<0.05$). Allen et al. (35) reported that onion consumption increased pyrosis. Dibley et al. (34) found that raw tomato and citrus consumption increased the symptoms of reflux.

In this study, the frequency of eating fried foods was examined and it was concluded that the individuals in the experimental group consumed more fried foods than the individuals in the control group ($p<0.05$). El Serag et al. (36) reported that eating fried foods increased GERD symptoms.

Study Limitations

In this study, the frequency of eating sugary foods was examined, and the rate of consuming sugary foods in the study group was significantly higher than the control group ($p<0.05$). Sweets are frequently consumed foods in our country and are high energy sources (37). Studies have reported that sugary foods and chocolate are reflugenic foods (33,38).

In this study, the consumption frequency of acidic and non-acidic beverages group was examined, and the consumption of Turkish coffee, cola drinks and soda was found to be significantly higher in the individuals in the study group compared to the individuals in the control group ($p<0.05$). It has been reported that soda consumption increases distention and acid secretion in the stomach, which leads to reflux (39). Fass et al. (40) reported that carbonated drinks increased pyrosis. Cola drinks have been reported to increase GERD symptoms in studies (10,20).

It was reported in the study conducted by Boekema et al. (41) that coffee consumption did not cause reflux. In a study conducted in 2014, it was reported that there was no significant relationship between coffee intake and GERD (42).

Conclusion

Dietary habits and lifestyle are the leading risk factors that can be changed in the prevention of this disease. The results obtained in our study and the related literature publications we reviewed show similar results, and it is very important to regulate proper nutrition and lifestyle in the prevention of GERD. In order to prevent GERD, 3 main meals should be eaten, and the stomach must not be filled out with the main meals. In order not to eat too much during these meals, snacks should be eaten. Food intake should be stopped at least 2-3 hours before going to bed. In our meals, fatty and carbohydrate foods should be less, and protein content should be higher. Foods such as spices, tomatoes, onions, garlic and citrus fruits, cola and carbonated drinks that increase the irritation of the esophagus should be minimized. It is important to do the necessary physical activity to keep the BMI levels of individuals within normal limits. Harmful habits such as smoking, and alcohol use should be avoided.

Ethics

Ethics Committee Approval: The "Ethics Committee Approval" dated 13 March 2019, numbered 104, was obtained from the İstanbul Okan University Ethics Committee for the survey study.

Informed Consent: The individuals included in the study read and signed the informed volunteer consent form which was signed by the researcher, and a copy was delivered to them.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: B.Y., H.F.A., Design: B.Y., H.F.A., Data Collection or Processing: B.Y., H.F.A., Analysis or Interpretation: B.Y., H.F.A., Literature Search: B.Y., H.F.A., Writing: B.Y., H.F.A.

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