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Gastroesophageal reflux disease prevalence in the city of Sivas

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Background/aims: *Epidemiological data of gastroesophageal reflux disease from Turkey is scarce. For this reason, we aimed to determine the gastroesophageal reflux disease prevalence in our region and to compare it with both the Western part of Turkey and with other countries in the world.* ***Material and methods:*** *We used a previously validated reflux questionnaire and applied it to a random sample of 1345 subjects stratified by socio-economic status, who were older than 20 years and were living in the city center of Sivas. The questionnaire was conducted by medical students who were attending Public Health internship.* ***Results:*** *We estimated a prevalence rate of 19.3% for gastroesophageal reflux disease, defined as heartburn and/or acid regurgitation at least once a week or more frequent. We found a significant association of gastroesophageal reflux disease with age, obesity, lying down within two hours after meals, and being under stress within the last one year, but not with smoking. Comorbid diseases associated with gastroesophageal reflux disease presence included recurrent pharyngitis, chronic cough, asthma, diabetes mellitus, hypertension, and chronic obstructive pulmonary disease, but not coronary heart disease. 50.8% of our subjects had visited a physician for gastroesophageal reflux disease symptoms. The most common drug they used was proton pump inhibitors.* ***Conclusion:*** *The prevalence of gastroesophageal reflux disease in a city of the Middle Anatolian region of Turkey was similar to that in developed countries and also to the results of another study performed in the Western part of Turkey. Further studies are needed to elucidate the role of environmental factors in the development of gastroesophageal reflux disease.*

Key words: Gastroesophageal reflux disease, epidemiology, Middle Anatolia

Sivas ilinde gastroözofageal reflü hastalığı prevalansı

Giriş ve Amaç: *Türkiye'deki gastroözofageal reflü hastalığı epidemiyolojisi ile ilgili veriler azdır. Bu nedenle amacımız bölgemizdeki gastroözofageal reflü hastalığı prevalansını saptamak ve aynı zamanda hem Türkiye'nin batısındaki verilerle hem de dünyadaki diğer ülkelerle kıyaslamaktır.* ***Gereç ve Yöntem:*** *Sivas il merkezinde yaşayan 20 yaş üstü, sosyoekonomik açıdan tabakalandırılmış 1345 bireye; uygunluğu önceden kanıtlanmış bir reflü anketi soruları soruldu. Anketörler Halk Sağlığı stajı yapan tıp fakültesi öğrencileriydi.* ***Bulgular:*** *Haftada en az bir kez retrosternal yanma ve/veya asit regürjitasyonu olarak tanımlanan gastroözofageal reflü hastalığı prevalansını %19.3 olarak saptadık. Gastroözofageal reflü hastalığı ile yaş, obezite, yemekten sonra 2 saat içinde uzanma ve son 1 yıl içerisinde stres altında kalma arasında anlamlı bir ilişki tespit ettik ancak sigara ile bir bağlantı bulamadık. Rekürren faranjit, kronik öksürük, astım, diabetes mellitus, hipertansiyon ve kronik obstrüktif akciğer hastalığı ile gastroözofageal reflü hastalığı varlığı ilişkili bulunurken; koroner arter hastalığı ile gastroözofageal reflü hastalığı arasında benzer ilişki saptanamadı. Gastroözofageal reflü hastalığı saptanan vakaların %50.8'i şikayetleri nedeniyle bir hekime başvurmuştu. Gastroözofageal reflü hastalığı saptanan vakaların en sık kullandıkları ilaç ise proton pompa inhibitörleriydi.* ***Sonuç:*** *Orta Anadolu Bölgesinde yer alan bir kentteki gastroözofageal reflü hastalığı prevalansı gelişmiş ülkelerin ve aynı zamanda Türkiye'nin batı bölgesinde gerçekleştirilmiş bir epidemiyolojik çalışmanın prevalans oranlarıyla benzerdi. Gastroözofageal reflü hastalığına çevresel faktörlerin etkisinin saptanabilmesi için daha ileri çalışmalara gerek vardır.*

Anahtar kelimeler: Gastroözofageal reflü hastalığı, epidemiyoloji, Orta Anadolu

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INTRODUCTION

Gastroesophageal reflux disease (GERD) remains a common and important clinical disorder not only by influencing patient's quality of life but by constituting a significant proportion of the total cost to the health care system as well. The mechanisms involved in the pathogenesis of GERD are complex, multifactorial, and incompletely understood and include gastric function abnormalities, dysfunction of the antireflux barrier, and abnormal esophageal transit and clearance (1,2). However, there appear to be racial differences in the clinical presentation as well as in the natural history of GERD between Eastern and Western societies. GERD is highly prevalent in Western societies such as the UK and the USA where the prevalence of at least monthly heartburn has been estimated to be about 29-44% (3). However, GERD is believed to be less prevalent in Asian countries. Genetic factors, high prevalence of Helicobacter pylori infection, dietary differences, and disparities in parietal cell mass and gastric acid secretion are possible factors that accounted for these racial differences (4). The epidemiological data of GERD from Turkey is scarce, thus, in the present study, we aimed to investigate the prevalence of GERD in a middle Turkey population in relation to demographic features, life-style and health-seeking behaviors of patients.

METHODS

Subjects

The study protocol was approved by the local ethics committee of Cumhuriyet University in Sivas. Sivas is a city located in the Middle Anatolian region of Turkey with a population of 250.000 in 2008, all Caucasian. We assumed a maximum GERD prevalence of 20% in the adult population. A questionnaire was applied with a face-to-face interview method. We enrolled randomly stratified 1345 people according to their socioeconomic level, and the inclusion criteria were men and women over 20 years old living in the city center of Sivas. The face-to-face interviews were conducted by medical students in the participants' homes, in April and May 2008.

Questionnaire

We used a reflux questionnaire developed by Locke et al., which was translated into Turkish (5). The questionnaire is one of the most widely used in this field, which enabled us to compare our results with those of other studies. It includes questions about the frequency and intensity of GERD-related symptoms as well as other data such as gender, age, occupation, body mass index (BMI), etc. The main topics investigated by the survey are given in Table 1.

Heartburn was defined as a burning sensation in the epigastric area that rises through the chest in

Table 1. Contents of the questionnaire

Demographic: Age, sex, body mass index, occupation, income, pregnancy, the number of persons in house
Typical and atypical reflux-related symptoms:
- Heartburn: Duration, frequency, severity
- Acid regurgitation: Duration, frequency, severity
- Dysphagia: Duration, frequency, severity
- Upper abdominal pain: Duration, frequency, severity
- Odynophagia
- Chronic cough
- Chronic pharyngitis
Medication use: Antacids, H_2-receptor blockers, proton pump inhibitors, prokinetic drugs, sucralfate, or others
Past gastrointestinal disease history
Past medical illness: Diabetes mellitus, hypertension, chronic obstructive pulmonary disease, asthma
Drug use associated with past medical illness: Non-steroid anti-inflammatory drugs, calcium channel blockers, aspirin, hormones
Life style: Cigarette, alcohol, caffeine, gas-producing drinks, chocolate, psychological stress, corset, go to bed within two hours after meal

the substernal area and as acid regurgitation of liquid coming back into the mouth leaving a bitter or sour taste. The period used to assess the prevalence of symptoms was the previous 12 months. Frequency of GERD symptoms were measured on the following scale: 1, less than once a month; 2, once a month; 3, once a week; 4, several times a week; 5, daily. Severity of GERD symptoms was assessed on the following scale:1, mild; 2, moderate; 3, severe; 4, very severe.

Data Handling and Statistical Analysis

Questionnaire data were entered through independent entry. SPSS computer software package (Version 16) was used. Data were compared by using the chi-square test. A p-value of 0.05 or less was considered to be statistically significant.

RESULTS

The mean age of our 1345 enrolled respondents was 42.57±16.54 years. 663 (49.3%) of our respondents were female and 682 (50.7%) of them were male. The prevalence of GERD, defined as heartburn and/or acid regurgitation at least once a week or more frequently, was 19.3%. Prevalence of daily symptoms were 1.2% for heartburn and 1.2% for regurgitation (Figures 1 and 2). We found that only 11.9% of our GERD patients experienced dysphagia (Figure 3).

GERD was significantly more prevalent in the 60-69 age group, while the least common age group was 20-29. There was a significant difference between the different age groups with regard to GERD prevalence. GERD was significantly more common in the participants having a BMI over 25. There was not any significant difference between the two genders in GERD presence (Table 2).

We also did not observe any significant difference between the participants with and without GERD in terms of variations in occupation, monthly income status, and number of household members (Table 2).

Among life style habits such as smoking, alcohol use, chocolate use, soft drink and coffee use, corset wearing, lying down within two hours after meal, and being under stress within the last year, only the two last-mentioned variables were found to be significantly related with GERD presence (Table 3).

GERD symptoms were more common among calcium-channel blocker users. However, we did not find a significant relation between GERD and the use of either aspirin, calcium-channel blocker, non-steroidal antiimflammatory (NSAI) drugs, or hormones (Table 4).

When we investigated the prevalence of diseases coexisting with GERD, we found a higher prevalence of GERD in patients with asthma ($\chi 2$ =8,31; p=0,00), diabetes mellitus ($\chi 2$=13,97 p=0.00), hypertension ($\chi 2$=13,85; p=0,00), and chronic obstructive pulmonary disease (COPD) ($\chi 2$=3,81; p=0,05).

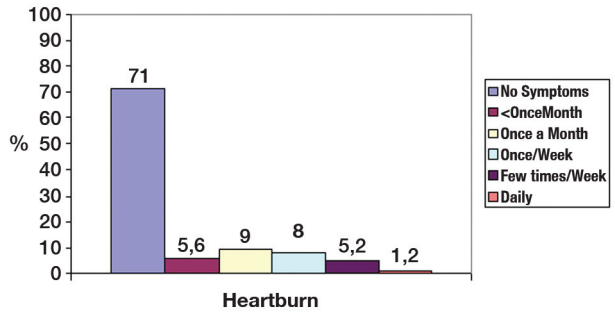

Figure 1. Distribution of heartburn among the respondents to the questionnaire

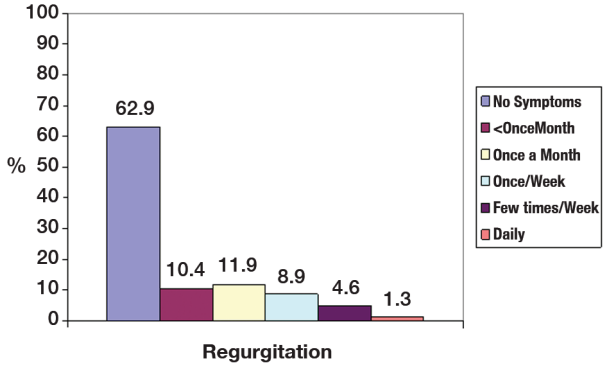

Figure 2. Distribution of regurgitation among the respondents to the questionnaire

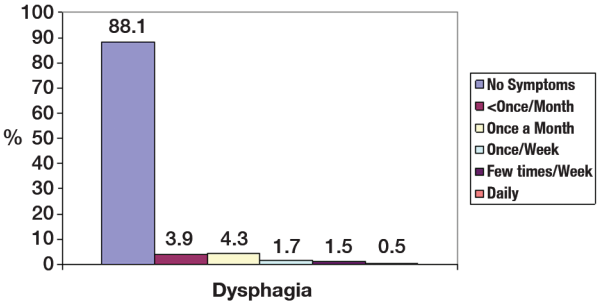

Figure 3. Distribution of dysphagia among the respondents to the questionnaire

Table 2. Characteristics of the respondents in terms of GERD presence

Characteristics of the patients		GERD Yes n	Yes %	No n	No %	Total	Statistical Significance
Age Groups							
	20-29	55	4,4	328	85,6	383	
	30-39	60	19,3	251	80,7	311	(χ^2 =19,8, p=0.01)
	40-49	47	20,8	179	79,2	226	
	50-59	32	17,2	154	82,8	186	
	60-69	26	22,4	90	77,6	116	
	70+	39	19,3	84	80,7	123	
Gender							
	Male	129	18,9	553	81,1	682	(χ^2 =0,10, p=0,75)
	Female	130	19,6	553	80,4	663	
Body mass index (BMI)							
	BMI	117	17,1	567	82,9	684	(χ^2 =3,87, p=0,049)
	BMI>25	142	21,5	519	78,5	661	
Occupation							
	Student	35	15,5	191	84,5	226	
	Housewife	82	23,2	271	76,8	353	(χ^2 =6,14, p=0,29)
	Officer	17	17,2	82	82,8	99	
	Retired	35	19,6	144	80,4	179	
	Tradesman	25	18,4	111	81,6	136	
	Other	65	18,5	287	81,5	352	
Monthly income							
	<500$	125	20,3	491	79,7	616	
	500-1500$	119	18,3	532	81,7	651	(χ^2 =0,825, p=0,662)
	>1500$	15	19,2	63	80,8	78	
# of persons in house							
	0-4	197	19,9	792	80,1	989	
	8	57	17,4	270	82,6	327	(χ^2 =1,06, p=0,59)
	>8	5	17,2	24	82,8	29	
Pregnancy							
	Yes	5	12,5	35	87,5	40	(χ^2 =0,80, p=0,37)
	No	254	19,4	1051	80,6	1305	

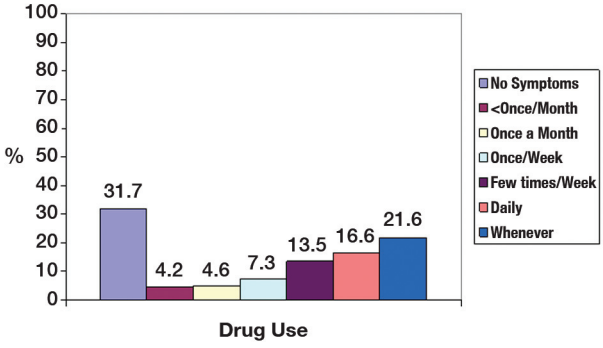

Figure 4. Frequency of drug use in GERD-positive respondents to relieve symptoms

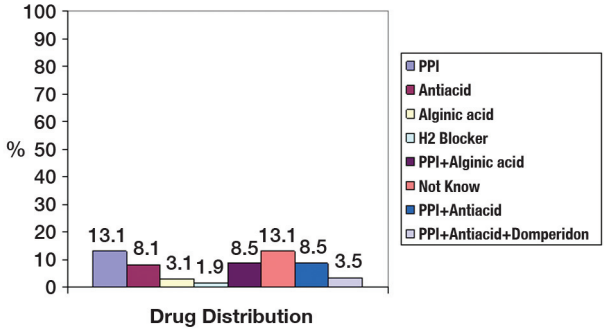

Figure 5. Drugs used by the GERD-positive respondents.

When we investigated the health-seeking behavior of GERD patients, we observed that only 50,8% of subjects had seen a physician for complaints occurring at least weekly. 31,7% of GERD patients had not used any drugs to relieve their complaints, and the majority of the patients had taken medication whenever they had complaints (Figure 4 and 5). The drugs most commonly used by the

Table 3. The effect of life style on GERD presence in our respondents

LIFE STYLE		GERD Yes n	Yes %	No n	No %	Total	Statistical Significance
Smoking							
	Never	158	18,0	722	82,0	880	
	Past	28	21,9	100	78,1	128	(χ^2 =2,75, p=0,25)
	Current	73	21,7	264	78,3	337	
Alcohol (At least 100 ml per week)							
	Yes	24	20,0	96	80,0	120	(χ^2 =0,01, p=0,92)
	No	235	19,2	990	80,8	1225	
One Chocolate/week (At least)							
	Yes	67	18,9	287	81,1	354	(χ^2 =0,03, p=0,85)
	No	192	19,4	799	80,6	991	
Stress within the last 1 year							
	Yes	141	27,0	381	73,0	522	(χ^2 =32,10, p=0,00)
	No	118	14,3	705	85,7	823	
Corset use							
	Yes	4	9,8	37	90,2	41	(χ^2 =2,46, p=0,12)
	No	255	19,6	1049	80,4	1304	
Lie down within 2 hours after meal							
	Yes, sometimes	96	23,0	321	77,0	417	
	Yes, often	31	30,7	70	69,3	101	(χ^2 =18,07, p=0,00)
	No	132	16,0	695	84,0	827	
Gaseous drink							
	Yes	86	18,9	369	81,1	455	(χ^2 =0,06, p=0,81)
	No	173	19,4	717	80,6	890	
Coffee							
	Yes	94	21,4	345	78,6	439	(χ^2 =1,95, p=0,16)
	No	165	18,2	741	81,8	906	

Table 4. The effect of drugs on GERD presence in our respondents

DRUGS		GERD Yes n	Yes %	No n	No %	Total	Statistical Significance
Aspirin							
	Yes	11	20,0	44	80,0	55	(χ^2 =0,0, p=1,0)
	No	248	19,2	1042	80,8	1290	
Ca-channel blocker							
	Yes	8	36,4	14	63,6	22	(χ^2 =3,17, p=0,075)
	No	251	19,0	1072	81,0	1323	
NSAI							
	Yes	9	20,9	34	79,1	43	(χ^2 =0,01, p=0,92)
	No	250	19,2	1052	80,8	1302	
Hormone							
	Yes	1	10,0	9	90,0	10	(χ^2 =0,12, p=0,73)
	No	258	19,3	1077	80,7	1335	

GERD patients were proton pump inhibitors (PPIs), followed by PPIs+antacids and PPIs+alginic acid.

DISCUSSION

In this study, we estimated a prevalence of 19,3% for GERD when defined as presence of symptoms

Table 5. GERD prevalence in some diseases

Diseases	Absent		Present		Total
	N	%	n	%	
DM	90	68,2	42	31,8	132
HT	138	70,8	57	29,2	195
CAH	2	66,7	1	33,3	3
COPD	27	67,5	13	32,5	40
Asthma	49	67,1	24	32,9	73
Previously known esophagogastric disease	104	46,2	121	53,8	225

DM: Diabetes mellitus. HT: Hypertension. CAD: Coronery artery disease. COPD: Chronic obstructive pulmonary disease.

at least once a week, and this result is similar to that of the study by Bor et al. performed in the Western part of Turkey in 2005 (6). We stratified the subjects according to their socio-economic status, so that our population was not a low-income one. We found a prevalence rate of heartburn at least weekly to be 14,4% and regurgitation to be 14,8%, while these rates were 10% and 15,6%, respectively, in the Bor et al.'s study. Our result for heartburn is higher, whereas regurgitation rate is nearly the same. The findings of these two studies from Turkey are similar to the results of the Western countries and higher than the prevalence values in Asian countries (7-10).

Cameron et al. have found out in a twin study that heritability accounted for 31% of the liability to reflux disease (11). If genetic factors account for only one third of the liability to reflux, the relevant environmental factors need to be defined and they are different in the Eastern and Western countries. Obesity for example is a major problem especially in the USA. 21,5% of our patients had higher than normal BMI, and we found GERD to be significantly more common in those people.

Sivas is one of the coldest cities in Turkey during winter when the consumption of hot beverages is very high. The temperature difference between Sivas and Menderes, the town in which the other epidemiological study in Turkey was performed, can be as high as 25 degrees Celsius during the winter season. In contrast with the Western part of Turkey where vegetables and fruits are abundant and freshly consumed, most of the people living in Sivas consume foods high in fat and carbohydrates. However, the GERD prevalence in our region was similar to that in the Western part of Turkey.

We could not find a statistically significant difference between the two genders with regard to GERD prevalence despite the fact that we included pregnant patients. Our results are in concordance with four cross-sectional studies and one longitudinal study showing no difference between the genders (7,8,12-14). We should note that several of the studies excluded pregnant participants from their analysis. There were 40 pregnant women in our study. Although it is a well-known fact that pregnancy is associated with GERD, we did not find an increased prevalence of GERD among pregnant respondents. This could perhaps be due to the low number of pregnant subjects.

The age-specific prevalence rate increased with age in our study, and this observation is in concordance with the results reported by other authors (3,8,15-17). Since aging decreases the motor power of esophagus, this is an expected finding.

We did not observe any correlation of GERD with smoking, consumption of soft drink, coffee, chocolate or alcohol, and corset use. However, there was a significant correlation of GERD with lying down within two hours after meal and being under psychological stress within the last year.

The results of other epidemiological studies investigating the relation between GERD prevalence and alcohol and/or coffee consumption are conflicting - some had found a correlation and others had not (8,18,19). In contrast with the many studies in the literature indicating a strong positive correlation between GERD and smoking, we did not find any relationship (8,12,13,17).

In our study, we found stress within one year to be more significant risk factor than some foods such as chocolate, gaseous drinks, or coffee. Terry et al. investigated particularly the relation between GERD and food consumption. The authors demonstrated that there was no association with consumption of trigger foods such as total fat, chocolate, mint, coffee, onions, citrus fruits, and toma-

to. They did also not find a correlation between GERD and time of the last meal of the day (18). However, we found a significant correlation between GERD and resting in a recumbent position within two hours after meal.

As for the comorbid diseases related with GERD, we determined a higher prevalence of GERD in the participants having previous gastroesophageal disease, recurrent pharyngitis, chronic cough, asthma, diabetes mellitus, hypertension, and COPD than the participants who do not have any of these comorbid conditions. In the study by Ruigomez et al., GERD patients were found to have an increased risk of cough, angina, gallbladder disease, sinusitis, and chest pain in the year following GERD diagnosis (17). But they did not observe any significant association with pneumonia, asthma, COPD, laryngitis, otitis, and hoarseness. We did not find an increased prevalence of GERD among our coronary heart disease patients.

Some studies have observed an association between the usage of aspirin or NSAIDs and the presence of GERD (13), whereas others have not (12,20). In our study, GERD was most commonly present in calcium-channel blocker users followed by NSAID, aspirin, and hormone users.

In relation to health-seeking behavior of GERD patients, the results vary among countries from 16% to 56% (21). Ho et al. from Singapore found that 40% of GERD patients used over-the-counter drugs or visited a physician for GERD symptoms (22). This is in contrast with a study by Locke et al. in which, only 5.45% of GERD subjects visited physicians (6). For these differences, cultural influence may play an important role. In the study by Wong et al., 48% of subjects with GERD had received treatment, 6% had taken over-the-counter medications, and 35% had visited physicians (9). In our study, we found that 50.8% of subjects had seen a physician for complaints occurring at least weekly. 68.3% of GERD patients had used drugs to relieve their complaints, which is higher than the rate reported by Wong et al., and the majority of our patients used these drugs whenever they had complaints. The most commonly used drugs by the GERD patients were PPIs, followed by PPIs+antacids and PPIs+alginic acid.

In summary, our study revealed a GERD prevalence of 19.3% in a population living in Sivas, a city located in the Central Anatolian region of Turkey. We found a significant association of GERD with age, higher BMI, lying down within two hours after meals, and being under stress within the last one year. Comorbid diseases associated with GERD presence were found to be recurrent pharyngitis, chronic cough, asthma, diabetes mellitus, hypertension, and COPD. We believe that future longitudinal and epidemiological studies are needed to identify other possible environmental or genetic risk factors that may be in associations with GERD.

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