



Prevalence of gastroesophageal reflux disease symptoms in Edirne city center

Edirne kent merkezinde gastroözofageal reflü hastalığı semptom prevalansı

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ABSTRACT • Background and Aims: Gastroesophageal reflux disease is a common condition that negatively affects quality of life. This study aimed to determine the prevalence of gastroesophageal reflux disease symptoms among adults living in the city center of Edirne and to identify factors associated with the presence of gastroesophageal reflux disease. **Materials and Methods:** This population-based cross-sectional study was conducted between July and October 2018 in the city center of Edirne, Türkiye. Individuals aged 18 years and older were included using stratified sampling based on age, sex, and neighborhood distribution. Data were collected through face-to-face interviews using a structured questionnaire. Gastroesophageal reflux disease was defined as the presence of heartburn and/or regurgitation occurring at least once per week. Sociodemographic characteristics, lifestyle factors, comorbidities, and medication use were evaluated. Statistical analyses were performed using appropriate parametric and nonparametric tests, and logistic regression analysis was used to identify factors associated with gastroesophageal reflux disease. **Results:** A total of 1,535 participants were included in the study (50.8% female; mean age 41.66 ± 16.1 years). The prevalence of gastroesophageal reflux disease symptoms was 15.9% (n = 244). Regurgitation was the most frequently reported symptom. Gastroesophageal reflux disease prevalence was significantly higher among smokers (p < 0.001), individuals with asthma (p = 0.006), and those using calcium channel blockers (p = 0.008). Higher educational level was also significantly associated with gastroesophageal reflux disease (p = 0.002). No significant associations were found between gastroesophageal reflux disease and body mass index, alcohol consumption, tea/coffee intake, or diabetes mellitus. **Conclusion:** The prevalence of gastroesophageal reflux disease symptoms among adults living in the city center of Edirne was 15.9%, indicating that gastroesophageal reflux disease is a common public health problem. Smoking, asthma, and calcium channel blocker use were identified as significant risk factors. These findings highlight the importance of lifestyle modification and careful medication selection in the prevention and management of gastroesophageal reflux disease.

Keywords: Gastroesophageal reflux disease, heartburn, regurgitation, prevalence

ÖZET • Giriş ve Amaç: Gastroözofageal reflü hastalığı, yaşam kalitesini olumsuz etkileyen yaygın bir durumdur. Bu çalışma, Edirne şehir merkezinde yaşayan yetişkinler arasında gastroözofageal reflü hastalığı semptomlarının prevalansını belirlemeyi ve gastroözofageal reflü hastalığı varlığı ile ilişkili faktörleri saptamayı amaçlamıştır. **Gereç ve Yöntem:** Bu toplum temelli kesitsel çalışma, Temmuz-Ekim 2018 tarihleri arasında Edirne kent merkezinde yürütülmüştür. Yaş, cinsiyet ve mahalle dağılımına göre tabakalı örnekleme yöntemi kullanılarak 18 yaş ve üzerindeki bireyler çalışmaya dahil edilmiştir. Veriler, yapılandırılmış bir anket kullanılarak yüz yüze görüşmelerle toplanmıştır. Gastroözofageal reflü hastalığı, haftada en az bir kez görülen pirozis ve/veya regürjitasyon varlığı olarak tanımlanmıştır. Sosyodemografik özellikler, yaşam tarzı faktörleri, komorbiditeler ve ilaç kullanımı değerlendirilmiştir. İstatistiksel analizler uygun parametrik ve nonparametrik testlerle yapılmış, gastroözofageal reflü hastalığı ile ilişkili faktörleri belirlemek için lojistik regresyon analizi kullanılmıştır. **Bulgular:** Çalışmaya toplam 1535 katılımcı dahil edilmiştir (%50.8 kadın; ortalama yaş 41.66 ± 16.1 yıl). Gastroözofageal reflü hastalığı semptomlarının prevalansı %15.9 (n = 244) olarak bulunmuştur. En sık bildirilen semptom regürjitasyondur. Gastroözofageal reflü hastalığı prevalansı sigara içenlerde (p < 0.001), astımı olan bireylerde (p = 0.006) ve kalsiyum kanal blokeri kullananlarda (p = 0.008) anlamlı derecede daha yüksek bulunmuştur. Yüksek eğitim düzeyi de gastroözofageal reflü hastalığı ile anlamlı şekilde ilişkili bulunmuştur (p = 0.002). Vücut kitle indeksi, alkol tüketimi, çay/kahve tüketimi ve diyabetes mellitus ile gastroözofageal reflü hastalığı arasında anlamlı bir ilişki saptanmamıştır. **Sonuç:** Edirne kent merkezinde yaşayan yetişkinler arasında gastroözofageal reflü hastalığı semptomlarının prevalansı %15.9 olup, gastroözofageal reflü hastalığının yaygın bir halk sağlığı sorunu olduğunu göstermektedir. Sigara kullanımı, astım ve kalsiyum kanal blokeri kullanımı önemli risk faktörleri olarak belirlenmiştir. Bu bulgular, gastroözofageal reflü hastalığının önlenmesi ve yönetiminde yaşam tarzı değişikliklerinin ve ilaç seçiminin önemini vurgulamaktadır.

Anahtar kelimeler: Gastroözofageal reflü hastalığı, pirozis, regürjitasyon, prevalans

INTRODUCTION

Gastroesophageal reflux (GER) is defined as the retrograde passage of gastric contents into the esophagus. In healthy individuals, brief episodes of physiological reflux may occur, particularly after meals, and are rapidly cleared by esophageal defense mechanisms without causing symptoms or complications. When reflux episodes become more frequent or prolonged and are associated with clinical symptoms or complications, the condition is defined as gastroesophageal reflux disease (GERD) (1,2).

GERD is a chronic and highly prevalent disorder that significantly impairs quality of life. The most typical symptoms of GERD are heartburn (pyrosis) and regurgitation. Consequently, the majority of epidemiological studies assessing GERD prevalence rely on self-reported symptoms, particularly the presence of heartburn and/or regurgitation occurring at least once per week. The prevalence of GERD varies widely across the world. Epidemiological studies report prevalence rates of approximately 10–20% in Western countries, whereas lower rates are generally observed in Asian populations (3-8). Studies conducted in Türkiye have reported GERD prevalence rates ranging between 10.9% and 33.9% (9-14). These variations may be attributed to differences in diagnostic criteria, questionnaire methods, sociocultural characteristics, dietary habits, and lifestyle factors. The pathogenesis of GERD is multifactorial, with dysfunction of the lower esophageal sphincter (LES) playing a central role. Additional contributing mechanisms include transient LES relaxations, impaired esophageal clearance, delayed gastric emptying, and increased gastric acid exposure. Several risk factors have been implicated in the development of GERD, such as obesity, smoking, advanced age, certain medications, and comorbid chronic diseases (15-20).

Despite the high burden of GERD, population-based prevalence studies using standardized methodologies remain limited in Türkiye. The present study aimed to determine the prevalence of GERD symptoms among adults living in the city center of Edirne and to identify factors associated with the presence of GERD.

MATERIALS and METHODS

Study Design and Population

This population-based cross-sectional study was conducted between July 2018 and October 2018 after receiving approval from the Ethics Committee for Scientific Research of the Trakya University School of Medicine, (Date: 17/02/2016, Decision number: 2016/23). The study population consisted of individuals aged 18 years and older residing in the city center of Edirne. The sample size was calculated assuming a GERD prevalence of 20%, with a margin of error of $\pm 3\%$, a confidence level of 95%, and a statistical power of 80%. Stratified sampling was performed based on age, sex, and neighborhood distribution using population data obtained from the Turkish Statistical Institute.

Data Collection

Data were collected through face-to-face interviews conducted at participants' residences by the researchers. Prior to data collection, official permission was obtained from the Edirne Public Health Directorate and the Office of the Governor. A structured questionnaire was administered, which included questions on sociodemographic characteristics (age, sex, marital status, and educational level), anthropometric measurements (height and weight), lifestyle factors (smoking, alcohol use, tea and coffee consumption), comorbid diseases, pregnancy status in female participants, regular medication use and healthcare-seeking behavior related

to reflux symptoms. GERD symptoms were assessed by querying the frequency of heartburn and regurgitation. Heartburn was defined as a burning sensation behind the sternum or in the throat, while regurgitation was defined as the effortless return of gastric contents into the mouth without nausea or retching. Symptom frequency was categorized as none, once per month, once per week, or more than once per week. Participants reporting heartburn and/or regurgitation at least once per week were classified as having GERD. The questionnaire used in this study was developed by the researchers based on previously published epidemiological GERD studies conducted in Türkiye and international symptom-based diagnostic criteria. The questionnaire focused on the frequency of heartburn and regurgitation symptoms and was reviewed by experienced gastroenterology and internal medicine specialists before implementation. Since the study primarily aimed to assess symptom prevalence in a community-based population, a symptom-based structured questionnaire approach was preferred instead of a formal GERD-specific validated scale such as GERDQ.

Statistical Analysis

Statistical analyses were performed using SPSS version 22.0. Descriptive statistics were used to summarize participant characteristics. The independent samples t-test was applied for comparisons between two groups when parametric assumptions were met, and the Mann–Whitney U test was used for nonparametric data. Categorical variables were analyzed using chi-square tests. Logistic regression analysis was conducted to identify potential risk factors associated with GERD. For all analyses, a two-sided p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 1,535 individuals living in the city center of Edirne were included in the study. Of the par-

ticipants, 50.8% (n = 780) were women and 49.2% (n = 755) were men. The ages ranged from 18 to 88 years, with a mean age of 41.66 ± 16.1 years and a median age of 40 years. Most participants were married (66.3%), while 33.7% were single, reflecting a heterogeneous and community-based sample. Sociodemographic characteristics, lifestyle factors, comorbidities, and medication use of the participants and their associations with gastroesophageal reflux disease are summarized in Table 1. According to body mass index (BMI), 44.6% of participants were overweight and 17.8% were obese, whereas 31.5% had normal weight and 6.1% were underweight. The high proportion of overweight and obese individuals highlights the increasing burden of obesity in the general population. Regarding lifestyle factors, 53.4% of participants were smokers and 18.8% reported consuming alcohol at least once per week. Daily tea and/or coffee consumption was very common (80.9%). At least one chronic disease was present in 32.8% of the participants, with diabetes mellitus being the most frequent (12%). Asthma was reported in 1.6% of the study population.

A total of 244 participants (15.9%) reported experiencing heartburn and/or regurgitation at least once per week and were therefore classified as having gastroesophageal reflux disease (GERD). Among individuals with GERD, 47.5% reported only regurgitation, 10.3% reported only heartburn, and 42.2% experienced both symptoms concurrently. Regurgitation was identified as the most frequently reported symptom. Statistical analysis revealed a significantly higher prevalence of GERD among smokers compared with non-smokers ($p < 0.001$). In addition, GERD was significantly more common among individuals using calcium channel blockers (CCBs) ($p = 0.008$) and among those with a diagnosis of asthma ($p = 0.006$). Educational level was also significantly associated with GERD

Table 1 Sociodemographic and lifestyle characteristics of participants and their association with GERD

Variable	GERD (+) n (%)	GERD (-) n (%)	Total n (%)	p value
Sex (Female)	131 (16.8)	649 (83.2)	780 (100)	0.327
Sex (Male)	113 (15.0)	642 (85.0)	755 (100)	
Age (mean $\pm$ SD)	—	—	41.66 $\pm$ 16.1	0.432
Marital status (Married)	162 (15.9)	855 (84.1)	1017 (100)	0.991
Marital status (Single)	82 (15.8)	436 (84.2)	518 (100)	
Education (University)	97 (21.7)	349 (78.3)	446 (100)	0.002
Education ($\leq$ High school)	147 (13.5)	942 (86.5)	1089 (100)	
Smoking (Yes)	156 (19.0)	663 (81.0)	819 (100)	<0.001
Smoking (No)	88 (12.3)	628 (87.7)	716 (100)	
Alcohol $\geq$ 1/week	51 (17.6)	238 (82.4)	289 (100)	0.366
Alcohol < 1/week / None	193 (15.5)	1053 (84.5)	1246 (100)	
BMI $\geq$ 25 kg/m ²	168 (17.5)	790 (82.5)	958 (100)	0.255
BMI < 25 kg/m ²	76 (13.2)	501 (86.8)	577 (100)	
Diabetes mellitus	34 (18.5)	150 (81.5)	184 (100)	0.307
Asthma	9 (36.0)	16 (64.0)	25 (100)	0.006
Calcium channel blocker use	11 (32.4)	23 (67.6)	34 (100)	0.008
NSAID use	5 (21.7)	18 (78.3)	23 (100)	0.440
Aspirin use	7 (19.4)	29 (80.6)	36 (100)	0.556
Daily tea/coffee use	198 (15.9)	1044 (84.1)	1242 (100)	0.968

GERD: Gastroesophageal reflux disease; BMI: Body mass index; NSAID: Nonsteroid anti-inflammatory drug.

prevalence, with higher rates observed as educational attainment increased ($p = 0.002$). No statistically significant relationships were found between GERD prevalence and BMI, alcohol consumption, tea-coffee intake, or the presence of diabetes mellitus, nonsteroidal anti-inflammatory drug (NSAID) or aspirin use in the study population. Logistic regression analysis was performed for variables that showed significance in univariate analyses. Smoking was independently associated with GERD symptoms (OR: 1.574, 95% CI: 1.123 - 2.205, $p = 0.008$). In addition, individuals with asthma had a significantly higher likelihood of GERD symptoms compared with those without asthma (OR: 2.929, 95% CI: 1.087 - 7.894, $p = 0.034$).

DISCUSSION

This population-based study demonstrated a GERD symptom prevalence of 15.9% among adults living in the city center of Edirne. These findings confirm that GERD is a common condition in the general population rather than being limited to individuals seeking medical care. Worldwide, GERD prevalence shows substantial geographic variation. While prevalence rates of 10 - 20% have been reported in Western countries, lower rates are generally observed in Asian populations. Previous studies conducted in Türkiye have reported GERD prevalence rates ranging from 10.9% to 33.9%. The prevalence identified in our study is consistent with both national averages and ra-

tes reported in European countries. An important finding of this study was the predominance of regurgitation over heartburn as the most frequently reported symptom. While heartburn is typically the dominant symptom in Western populations, regurgitation has been reported more frequently in Eastern societies, including Türkiye. This discrepancy may be explained by cultural and linguistic factors, as the term “heartburn” may not be well understood by the general population and is often described as dyspeptic or epigastric discomfort. No significant association was found between GERD prevalence and age or sex in our study. Although several studies have reported an increase in GERD prevalence with aging, others have failed to demonstrate such a relationship. Differences in study design, population characteristics, and diagnostic criteria may contribute to these inconsistent findings (8,9,11). Smoking was strongly associated with GERD in this study, consistent with previous literature (21). Smoking is known to reduce lower esophageal sphincter pressure, delay esophageal clearance, and impair mucosal defense mechanisms, thereby facilitating reflux. Smoking cessation remains a crucial component of lifestyle modification in GERD management. A significant association between asthma and GERD was also observed. The relationship between these two conditions appears to be bidirectional. Reflux-related microaspiration and vagally mediated reflexes may exacerbate asthma, while asthma-related changes in intrathoracic pressure and certain medications may increase reflux episodes (22). An association between calcium channel blocker use and GERD symptoms was observed in our study. This finding is consistent with the known pharmacological effects of these medications, particularly their ability to reduce lower esophageal sphincter pressure. However, this association should be interpreted cautiously, since calcium channel blocker use did not remain significant in multivariate analysis (23).

Contrary to some previous reports, no significant association was found between BMI and GERD in this study. While obesity is widely recognized as a risk factor for GERD, population-based studies have yielded inconsistent results. Variations in fat distribution, abdominal pressure, and lifestyle factors may partially explain these discrepancies (24). Another noteworthy finding was the positive association between higher educational level and GERD symptoms. This association may not necessarily indicate a direct biological relationship. Individuals with higher educational attainment may be more aware of gastrointestinal symptoms and therefore more likely to recognize and report reflux-related complaints. Increased health literacy and healthcare-seeking behavior among highly educated individuals may partially explain this finding. In addition, educational level was not evaluated as an independent predictor in multivariate analysis, and therefore this relationship should be interpreted cautiously.

Although NSAIDs and aspirin have been reported to contribute to upper gastrointestinal symptoms and may aggravate reflux-related complaints through mucosal irritation, no significant association was observed in our study. This finding may be related to the relatively small number of regular NSAID and aspirin users in the study population, the lack of detailed assessment regarding drug dosage and duration, and the symptom-based definition of GERD. In addition, concomitant use of acid-suppressive medications among these individuals may have reduced reflux-related symptom reporting.

This study has several limitations. First, GERD diagnosis was based on symptom frequency rather than objective diagnostic methods such as endoscopy or 24-hour pH monitoring. Second, waist circumference and abdominal obesity measurements were not evaluated. Since central obesity may be more strongly associated with GERD than BMI

alone, the absence of these parameters may have influenced the lack of association observed between BMI and GERD symptoms. Third, the cross-sectional design does not allow causal inference.

In conclusion, in this community-based study conducted in the city center of Edirne, the prevalence of gastroesophageal reflux disease symptoms was found to be 15.9%. Regurgitation was the most commonly reported symptom. While smoking and asthma were identified as significant risk factors for GERD, calcium channel blocker use was found to increase the risk of GERD in univariate analysis. Additionally, higher educational level was associated with increased symptom reporting. No significant associations were observed between GERD and BMI, alcohol consumption, tea-coffee intake, or diabetes mellitus. These findings suggest that GERD is a multifactorial condition influenced by a complex interplay of lifestyle, medical, and

pharmacological factors. The results of this study highlight GERD as a prevalent condition with a substantial impact on public health and quality of life. Preventive strategies focusing on smoking cessation, careful medication selection, and increased awareness among high-risk groups are essential. Future large-scale studies incorporating objective diagnostic methods are needed to further elucidate the epidemiology and risk factors of GERD.

Ethics Approval: *This study protocol was approved by the Ethics Committee for Scientific Research of Trakya University School of Medicine (Date: 17.02.2016, Decision No: 2016/23). The study was conducted in accordance with the World Medical Association Declaration of Helsinki.*

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