

## Lifestyle Factors and Symptoms of Gastroesophageal Reflux Disease: A Cross-sectional Study

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### ABSTRACT

**Background and Objectives:** Gastroesophageal Reflux Disease (GERD) is a condition characterized by heartburn and acid regurgitation without signs of oesophageal mucosal injury on one hand, and erosive oesophagitis and Barrett's oesophagus consequences like oesophageal cancer on the other. The aim of this study was to explore the involvement of different lifestyle-related factors in the aetiology of symptomatic GERD.

**Methods:** In this cross-sectional study, 79 patients (28 men and 51 women) aged between 20-68 years old were recruited randomly through a direct interview between January to October 2021, and they were prescribed Proton Pump Inhibitors. Prior to starting this study, the approvals had been granted by the ethics committee and oral consent was gained from the participants. A questionnaire was designed and consisted of demographic and clinical characteristics regarding GERD. Statistical analysis was done using SPSS version 25 for describing frequencies and percentages, followed by Chi-square and Fisher's Exact tests as inferential statistical analysis for finding associations between variables.

**Results:** Among the total of 79 patients with gastroesophageal reflux disease, the findings indicated that more than half of the study sample (58.2%) were overweight and obese (26.6% and 31.6% respectively), and the heavy smokers made the highest percentage among smokers (19%). There was a statistically significant association between gender and smoking and BMI among GERD patients ( $P$ -value = 0.001 and  $< 0.001$  respectively). There was a very highly significant association between BMI and heartburn and nausea and vomiting ( $P$ -value = 0.001 for both), while there was a non-significant association between BMI and chest pain, cough, and sleep pattern disturbance ( $P$ -value = 0.324, 0.558, and 0.907 respectively).

**Conclusion:** A higher BMI and smoking are associated with a higher likelihood of GERD symptoms.

**Keywords:** Lifestyle Factors; Gastro-Esophagus Reflux Disease; Population-Based Study.

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## INTRODUCTION

Gastroesophageal reflux disease (GERD) or acid reflux occurs when the liquid content of the stomach regurgitates (backs up or refluxes) into the oesophagus. GERD is a long-term illness. It usually lasts a lifetime once it starts. Heartburn, regurgitation, and nausea are symptoms of simple GERD [1]. A condition in which the reflux-damaged epithelium of the oesophagus is replaced by metaplastic columnar epithelium is known as Barrett's oesophagus (BE) and has been hypothesized as the end consequence of a stepwise disease process that transitions through GERD and oesophageal adenocarcinoma [2]. Gastroesophageal reflux disease (GERD) is particularly frequent in Asians, with prevalence rates ranging from 50 to 70% [3]. Endoscopic evaluation of oesophageal mucosal changes in patients with reflux symptoms is essential for diagnosing patients with varying degrees of severity [4]. Many studies have looked at the relationship between GERD and risk factors like age, gender [4-5,] BMI, and obesity, but there have been few large-scale studies focusing solely on GERD symptoms. Because GERD is such a common disease that affects millions of individuals all over the world, it is critical to understand the underlying lifestyle variable that causes varied GERD symptoms [6]. This gender differential in the spectrum of GERD has previously been linked to sex steroid hormones, albeit little is understood about the mechanism behind it, according to several epidemiologic studies, the prevalence of GERD in women is strongly associated with reproductive status, implying a probable link with estrogen levels [7]. The inactivation of mast cells by the anti-inflammatory activity of estrogen may account for the gender difference in the GERD spectrum. Other research has investigated the role of female steroid [2].

hormones in the gender gap in these disorders, while obesity is a major risk factor for GERD, and estrogen has been shown to influence fat metabolism. Furthermore, smoking is associated with an increased risk of GERD in the elderly [8]. Acidic foods, the amount and timing of meals as well as a lack of sleep can all contribute to GERD symptoms [9]. Lifestyle factors such as smoking, being overweight or obese, and eating late at night have been linked to an increased risk of developing gastroesophageal reflux disease (GERD) [10]. People who eat spicy foods and sleep on their left side are more likely to get GERD. Excessive painkiller usage, eating in between meals, drinking too much coffee, and taking unneeded drugs can all cause GERD [11]. also, GERD was found to be associated with meals before bedtime in past studies [12]. Endoscopic observation can detect reflux esophagitis (RE) and non-erosive reflux disease (NERD), two pathological stages of gastroesophageal reflux disease (GERD) (NERD, mainly diagnosed based on upper gastrointestinal symptoms). According to most studies, NERD patients make up more than half of all GERD patients [13]. In a study that used a newly developed and validated GERD questionnaire with an interview-based observational study to standardize the symptom-based diagnosis and evaluate treatment response in patients with GERD showed that a total of six symptoms, four positive and two negative predictors, were used to evaluate the frequency of GERD, the positive predictors included heartburn and regurgitation, as well as sleep disturbance, and the use of additional over-the-counter medication; while the negative predictors included pain or discomfort in the stomach and nausea [14]. When the normal symptoms of heartburn and regurgitation were combined with endoscopic evidence of esophagitis, GERD was identified.

Patients who exhibited symptoms of reflux esophagitis and had been treated with proton pump inhibitors (omeprazole 20 mg twice daily) for 14 days were deemed to have GERD in the same external environment (e.g. similar time of sleep, daily activity, etc) so it has been suggested that the association with regular Protein Pump Inhibitor (PPI) use was the result of indication bias, i.e., the relationship was due to the fact that regular PPI use was more common in patients with more severe GERD [15]. The aim of this study was to explore the involvement of different lifestyle-related factors in the aetiology of symptomatic GERD in those treated with Proton Pump Inhibitors.

## METHODS

This cross-sectional study was conducted between January to October 2021. The 79 patients (28 men and 51 women) aged between 20-68 years old were recruited randomly in the Department of Gastroesophageal Reflux Disease at Rizgary Teaching Hospital in Erbil city, Kurdistan Region of Iraq between February and June 2021. The data were collected through a direct interview (face-to-face) method of approximately 45 minutes duration with each participant. They were prescribed Proton Pump Inhibitors by their physicians. Formal approval was obtained by the ethical committee of the College of Pharmacy, Hawler Medical University under the code HMUPE 461 on 24th January 2021 and carried out in compliance with the ethical standards. Before the explaining purpose of this study to each participant, informed oral consent was obtained from each of them. The researchers guaranteed to keep the patient's information confidential and use the data for this study only. In addition to the above, the researcher told each participant that participation was voluntary, and he or she could leave at any time even if the

process was not completed. A questionnaire was designed as a tool for data collection and consisted of two main parts. Part One included some demographic characteristics like age, gender, body mass index based on weight and height, and current smoking status. Part Two included clinical characteristics regarding GERD such as heartburn, chest pain, cough, nausea, vomiting, and disrupted sleep patterns. Statistical analysis was conducted using SPSS version 25 computer software "Statistical Package for Social Sciences". The quantitative data were described by frequency and percentage. The inferential statistical analysis was assessed by using Chi-square and Fisher's Exact tests. The P-value was considered significant at  $\leq 0.05$ .

## RESULTS

The study enlisted the participation of 79 patients with gastroesophageal reflux disease. Table 1 shows some demographic characteristics of the study sample. The majority of the study sample was between 30-39 and 40-49 years old (26.6% and 25.3% respectively). Males made up 35.44% of the overall sample, while females made up 64.56% of the participants. Regarding the Body Mass Index, more than half of the study sample (58.2%) were overweight and obese (26.6% and 31.6% respectively). Furthermore, half of the participants were light smokers (7.6%), moderate smokers (11.4%), heavy smokers (19%) and shisha smokers (10.1%). Heavy smokers made the highest percentage among smokers (19%). Table 2 shows the association between patients in each BMI category with age, gender, and smoking. A non-significant difference was found between age and BMI among GERD patients. There was a statistically significant association between gender and smoking with the BMI among GERD patients (P-value = 0.001 and  $< 0.001$  respectively).

**Table 1:** Demographic characteristics of the study sample

Demographic characteristics	F. (%)
<b>Age group (years)</b>	
20-29	14(17.7)
30-39	21(26.6)
40-49	20(25.3)
50-59	15(19)
≥60	9 (11.4)
<b>Gender</b>	
Male	28(35.44)
Female	51(64.56)
<b>BMI</b>	
Underweight	5 (6.4)
Normal	28(35.4)
Overweight	21(26.6)
Obesity	25(31.6)
<b>Smoking</b>	
Non-smoker	41(51.9)
Light smoker	6(7.6)
Moderate smoker	9(11.4)
Heavy smoker	15(19)
Shisha	8 (10.1)

Table 3 demonstrates the association between patients in each BMI category with clinical characteristics regarding GERD. There was a very high statistically significant association between BMI and heart-burn and nausea and vomiting (P-value = 0.001 for both), while there was a non-significant association between BMI and chest pain, cough, and sleep pattern disturbance (P-value = 0.324, 0.558, and 0.907 respectively).

**Table 2:** Association between Body Mass Index and Demographic characteristics

Demographic characteristics	BMI Category				P-Value
	Underweight F.(%)	Normal F.(%)	Overweight F.(%)	Obesity F.(%)	
<b>Age group (years)</b>					
20-29	1(1.32)	4(5.26)	3(3.95)	6(7.89)	0.848
30-39	0(0)	6(7.89)	9(11.84)	6(7.89)	
40-49	2(2.63)	8(10.53)	5(6.58)	5(6.58)	
50-59	1(1.32)	6(7.89)	3(3.95)	4(5.26)	
≥60	1(1.32)	0(0)	1(1.32)	5(6.58)	
<b>Gender</b>					
Female	4(4.12)	18(18.56)	9(9.28)	20(20.62)	0.001
Male	1(1.03)	10(10.31)	12(12.37)	5(4.15)	
<b>Smoking</b>					
Non-smoker	1(1.03)	12(12.37)	9(9.28)	19(19.59)	< 0.001
Light	0(0)	3(3.09)	2(2.06)	1(1.03)	
Moderate	0(0)	5(5.15)	1(1.03)	3(3.09)	
Heavy	2(2.06)	4(4.12)	7(7.22)	2(2.06)	
Shisha	2(2.06)	4(4.12)	2(2.06)	0(0)	

**Table 3:** Association between Body Mass Index and Gastro-intestinal symptoms

Demographic characteristics	BMI Category				P-Value
	Underweight F.(%)	Normal F.(%)	Overweight F.(%)	Obesity F.(%)	
Heartburn	4(4.12)	23(23.71)	16(16.49)	17(17.53)	0.001
Chest pain	1(1.03)	5(5.15)	2(2.06)	5(5.15)	0.324
Cough	0(0)	2(2.06)	3(3.09)	2(2.06)	0.558
Nausea and Vomiting	4(4.12)	15(15.46)	10(10.31)	17(17.53)	0.001
Disrupted sleep	0(0)	1(1.03)	1(1.03)	1(1.03)	0.907

## DISCUSSION

According to the current study, exogenous exposures in the form of lifestyle-related factors such as being overweight, and smoking have a crucial role in the aetiology of GERD. It found that there was a significant association between obesity and frequent GERD symptoms, but non-significant with smoking. A study done by Yamamichi et al showed a significant association between BMI and obesity in GERD adult subjects. However, in contrast to previous studies [16-18] that showed a positive correlation between obesity or overweight and both erosive reflux disease, it only looked at the symptoms of GERD. Several epidemiological studies have found a link between smoking and GERD or reflux symptoms [19-20]. Cigarette smoking is thought to aggravate reflux disease by causing acid reflux and perhaps causing a long-term reduction in lower oesophageal sphincter pressure. The age of the participant has an effect and an increased risk of serious consequences in an elderly patient may require a more aggressive treatment approach [21]. Although the examination and management of GERD in elderly individuals are largely the same as for all adults, there are some unique issues of cause, evaluation, and treatment that must be considered when working with the elderly [22].

A study done by Wang et al (2016) observed a positive relationship between GERD and increasing age [14]. This study showed a significant association between gender and GERD, and females' proportions grew with age, but males' proportions were lowest. Increased body mass may or may not be a cause of cough. GERD symptoms can be avoided by maintaining a healthy weight, getting adequate sleep, and adhering to a healthy diet. An association between BMI and the frequency of chest pain was found to be insignificant. Retrosternal burning, regurgitation, cough, sleep disturbances, and reflux esophagitis are all recognized as symptoms of GERD [23]. The latter is the most common manifestation of oesophageal injury as in a study of 3153 people with severe heartburn or regurgitation symptoms by Nilsson et al. in a case-control study among GERD patients [24].

## CONCLUSION

The findings of this study imply that an increased BMI is associated with a higher incidence of GERD symptoms. The effects of smoking on gastroesophageal reflux disease appear to be significant.

## CONFLICT OF INTEREST

The author reports no conflict of interests.

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