

# Value of Heartburn for Diagnosing Gastroesophageal Reflux Disease in Severely Obese Patients

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## Abstract

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**Objective:** To evaluate the prevalence of gastroesophageal reflux disease (GERD) in severely obese patients and the association between symptoms and objective data of GERD in this population.

**Research Methods and Procedures:** A total of 158 consecutive severely obese patients (BMI  $\geq 40$  kg/m<sup>2</sup>) were prospectively evaluated. Symptoms were evaluated by a structured clinical questionnaire. Objective assessment was made by ambulatory 24-hour esophageal pH monitoring and endoscopy. GERD was defined by the presence of symptoms or complications (esophagitis). The clinical criterion defining GERD was the presence of at least two episodes of heartburn per week.

**Results:** The mean age of the 138 patients subjected to complete study was  $42.6 \pm 10.2$  years, with a BMI of  $50.1 \pm 6.9$  kg/m<sup>2</sup> (range, 40.6 to 69.4 kg/m<sup>2</sup>); 78% were women. The prevalence of GERD evaluated by symptoms and/or esophagitis was 33.3% (46/138). Clinical criteria of GERD were present in 31/138 cases (22.5%), and 26 (18.8%) had esophagitis. In 69/138 patients (50%), pH-metry was abnormal. Fifty-three patients with esophagitis

and/or abnormal pHmetry were asymptomatic. The sensitivity of heartburn as a diagnostic criterion of GERD in patients with severe obesity was 29.3%, with a specificity of 85.7%. No significant association was observed between severe obesity grade and the prevalence of symptoms and/or objective data.

**Discussion:** Asymptomatic gastroesophageal reflux (abnormal esophageal acid exposure and/or reflux esophagitis) is more common than symptomatic gastroesophageal reflux in severely obese patients. Increased BMI is not associated with a greater prevalence of GERD in these patients.

**Key words:** severe obesity, gastroesophageal reflux disease, heartburn, sensitivity, diagnostic criterion

## Introduction

Obesity, defined by a BMI of  $\geq 30$  kg/m<sup>2</sup>, constitutes a public health problem in most industrialized countries, because it is frequently associated with different comorbidities (1–4), a shortened life expectancy (5–7), and severe alteration of health-related quality of life (8,9). The situation is further aggravated as BMI increases—the extreme condition being represented by severe obesity (SO)<sup>1</sup>, defined as a BMI  $\geq 40$  kg/m<sup>2</sup>.

While gastroesophageal reflux disease (GERD) has been related to excess body weight and obesity, the association has not been sufficiently studied because of methodological reasons—including the way in which GERD is studied and population sample heterogeneity.

The presence of typical GERD symptoms (heartburn and regurgitation) is more prevalent in overweight and obese individuals, as has been shown by most general population-based epidemiological studies (10–14). However, few stud-

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<sup>1</sup> Nonstandard abbreviations: SO, severe obesity; GERD, gastroesophageal reflux disease; LES, lower esophageal sphincter.

**Table 1.** Patient characteristics

	Total (n = 138)	Women (n = 108)	Men (n = 30)
Age (years)	42.6 ± 10.2 (21 to 61)	43.3 ± 10.2 (21 to 61)	40.1 ± 9.8 (21 to 61)
Height (cm)	162.3 ± 8.7 (142 to 189)	159.7 ± 6.2 (142 to 176)	171 ± 9.7 (144 to 189)
Weight (kg)	132.2 ± 21.3 (86 to 215)	127.8 ± 18.3 (86 to 190)	147.7 ± 24.3 (110 to 215)
BMI (kg/m <sup>2</sup> )	50.1 ± 6.9 (40.6 to 69.4)	50.1 ± 6.5 (40.6 to 69.4)	50.2 ± 8.3 (41.6 to 69.4)
Smoker (%)	42.3	39.3	53.3
Ex-smoker (%)	17.5	17.8	16.7
Non-smoker (%)	40.2	43	30
Alcohol abuse (%)	7.4	6.6	10
Social drinker (%)	13.2	8.5	30
No alcohol abuse (%)	79.4	84.9	60

ies on a systematic basis and involving subjective (presence of characteristic symptoms) and objective (esophageal pHmetry and upper digestive endoscopy) data have evaluated GERD in subjects with obesity in general and with SO in particular (15,16).

This study explores the prevalence of GERD in patients with SO and evaluates the association between symptoms and objective data (pathological esophageal pHmetry and/or esophagitis) of GERD in this population.

### Research Methods and Procedures

A prospective study was conducted between July 2001 and February 2004, with the inclusion of 158 consecutive and unselected patients with SO (BMI ≥ 40 kg/m<sup>2</sup>) that were referred for study before bariatric surgery. Patient evaluation was based on the following. 1) A structured clinical interview was delivered to collect clinical data related to the history of the esophageal symptoms. The patients were specifically questioned about the presence and frequency of presentation of typical GERD symptoms (heartburn and regurgitation). Demographic and anthropometric data were also collected, and the patients were questioned about smoking and alcohol consumption. The presence of two or more heartburn episodes per week was used as diagnostic criterion of GERD (17,18). 2) Esophageal manometry and ambulatory esophageal pH monitoring was performed according to a standardized protocol as described elsewhere (19, 20). The position of the pH probe was 5 cm above the proximal margin of the lower esophageal sphincter (LES) that had been previously calculated by manometry. Positive pHmetry was defined as pH <4 for a total time of >5%, time in the standing position >8%, and time in decubitus >4% (based on our own normality reference values) (21). 3) Esophagitis was assessed by upper digestive endoscopy and was classified according to the Los Angeles classification (22). Endoscopy was carried out in the ab-

sence of antisecretory treatment effects. Only four patients were taking antisecretory medications, and this treatment was withdrawn 15 days before endoscopy. For the effect of analysis, 20 patients (12.7%) were excluded, because they failed to complete the full study protocol.

The qualitative variables are expressed as number (*n*) and percentage. Quantitative variables are expressed as the mean ± standard deviation and range. Univariate analysis was performed using the  $\chi^2$  or Fisher exact test for qualitative variables and the Student's *t* test for quantitative variables. Statistical significance was accepted at *p* < 0.05.

### Results

Table 1 shows the patient characteristics, differentiated according to sex. Sixty-four patients (46.4%) reported heartburn, with a similar distribution between women (43.5%) and men (56.7%). Symptomatic diagnostic criteria of GERD were recorded in 31 patients (22.5%), with a greater frequency in men (30%) than in women (20.3%), although statistical significance was not reached. The prevalence of regurgitation was lower (22.5%), it constituted the only symptom in 3 patients, and was associated with heartburn in 15 patients. Dysphagia was reported by 12 patients (8.7%) and constituted the only symptom in 2 cases (Table 2).

Abnormal ambulatory esophageal pHmetry was observed in 69 patients (50%), with a greater frequency in men (66.7%) than in women (45.4%; *p* = 0.026). In 14 cases (20.3%), gastroesophageal reflux was recorded in the standing position; in 26 (37.7%), it was recorded in the decubitus, and in 29 (42.0%), it was recorded in both.

Twenty-six patients (18.8%) showed esophagitis (9 Los Angeles grade A, 16 grade B, and 1 grade C). No patient showed grade D esophagitis or other lesions associated with GERD, including Barrett's esophagus.

LES tone in this cohort was 16.1 ± 9.0 mm Hg (median 14.0 mm Hg; range, 4 to 75 mm Hg). The LES was hypotonic (<10 mm Hg) in 23 patients (16.7%).

**Table 2.** Prevalence and weekly frequency of characteristic GERD symptoms

Heartburn	No		74	53.6%
	Yes	<2	33	23.9%
		2 to 5	11	8.0%
		>5	20	14.5%
		Total	64	46.4%
Regurgitation	No		107	77.5%
	Yes	<2	21	15.2%
		2 to 5	6	4.4%
		>5	4	2.9%
		Total	31	22.5%
Dysphagia	No		126	91.3%
	Yes	<2	9	6.5%
		2 to 5	3	2.2%
		>5	0	0%
		Total	12	8.7%

GERD, gastroesophageal reflux disease.

Eighty-four of 138 patients (60.9%) presented abnormal gastroesophageal reflux evaluated by symptoms, esophagitis, and/or positive pHmetry. Forty-six of 138 patients (33.3%) satisfied diagnostic criteria of GERD, based on the symptoms and/or endoscopy. pHmetry constituted the only data of abnormal gastroesophageal reflux in 38/138 patients (27.5%; Figure 1). Seventy-five of the 138 patients had objective data of abnormal gastroesophageal reflux (esophagitis and/or positive pHmetry), but only 22 of them satisfied symptomatic criteria of GERD. Fifty-three patients with esophagitis and/or abnormal pHmetry were asymptomatic. Fifteen of 46 patients with esophagitis were asymptomatic. The sensitivity of heartburn as a diagnostic criterion of GERD was 29.3%. Of the 63 patients without objective data of GERD, only 9 experienced heartburn two or more times a week; as a result, the diagnostic specificity

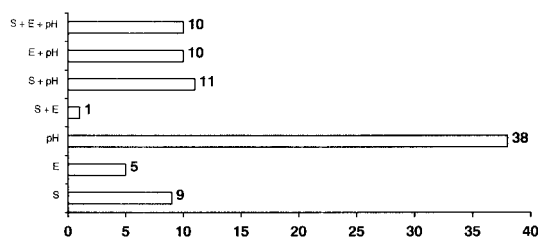


Figure 1: Patients (*n*) with symptoms and/or objective data of abnormal gastroesophageal reflux disease (*n* = 84). S, symptoms (heartburn at least two times per week); E, esophagitis; pH, pathological ambulatory esophageal pHmetry.

of this parameter was 85.7%. The positive predictive value of heartburn in GERD was 70.07%, with a negative predictive value of 50.46%.

No significant association was observed between SO grade [evaluated cut-off points:  $\geq 45$ ,  $\geq 49$  (median),  $\geq 50$ ,  $\geq 55$ , and  $\geq 60$  kg/m<sup>2</sup>] and the prevalence of symptoms and/or objective data of GERD. A statistically significant association ( $p = 0.011$ ) was found between the presence of GERD (any diagnostic criterion) and male sex and between abnormal pHmetry and smoking ( $p = 0.014$ ).

## Discussion

A considerable yet heterogeneous body of data can be found in the literature on the prevalence of GERD and its relation to obesity. In this context, the published studies differ in terms of the individuals included: general population (10–14,23–28), individuals with excess body weight and obesity (16), and subjects with SO (15,29,30). Additionally, differences are observed in terms of the applied GERD diagnostic criteria. This is of relevance, because the true prevalence may be either over- or underestimated as a result. We decided to center our study on patients with SO and exhaustively studied the presence of GERD, applying symptomatic diagnostic criteria and objective tests (endoscopy and esophageal pHmetry). Based on this systematic evaluation, the prevalence of GERD was seen to be high (60.9%) and greater than in other studies (31). Other studies based on both symptomatology and objective tests have recently reported GERD rates similar to our own (15).

In our series, 48.5% of the patients reported at least one weekly episode of heartburn and/or regurgitation—this percentage being higher than that reported elsewhere both in population-based studies recording data in obese individuals (10,11,28,32,38) and in studies that specifically evaluate individuals with SO (29). On the other hand, application of the symptomatic diagnostic criterion of GERD yielded a prevalence of 22.5%—this value being greater than that reported in an epidemiological study (34) of the Spanish general population (with an estimated symptomatic GERD prevalence of 15.6%). However, we found no significant correlation between BMI and the presence of GERD based on symptomatic criteria in our patients with SO.

The prevalence of abnormal gastroesophageal reflux quantified by esophageal pHmetry was much higher (50%) and similar to that reported in an earlier study (35). However, unlike the latter, and in agreement with the findings of other authors (29), we observed no association between increased BMI and greater esophageal exposure to acid, as quantified by ambulatory 24-hour esophageal pHmetry. Nevertheless, although LES tone in our cohort was quantitatively inferior to that reported for the Spanish general population (35), only 16.7% of our patients with SO had a hypotonic LES <10 mm Hg. Similar prevalences have been reported in earlier studies in which percentage LES hypo-

tonicity was found to be highly variable (6% to 25%) (15,30,37,38). The LES tone of patients with pathological pHmetry was found to be lower than that of patients with normal pHmetry findings and no other criterion of GERD (14.5 vs. 17.7 mm Hg); this difference was statistically significant.

Of note is the high proportion of patients in our series (38.4%) with objective criteria of abnormal gastroesophageal reflux who remained asymptomatic. Likewise, more than one half of our patients with esophagitis reported no symptoms. These observations suggest a decrease in esophageal sensitivity, at least in some patients with SO, thereby reducing the value of the presence of symptoms for diagnosing GERD. This observation requires confirmation by studies specifically designed to assess esophageal sensitivity to gastroesophageal reflux. The absence of a control group is a limitation of this study. However, the absence of a control group is due to the fact that studies analyzing the prevalence of asymptomatic gastroesophageal reflux disease have not been reported in a healthy population. Generally, it is very difficult to recruit healthy subjects who would like to participate in studies where invasive techniques are used. Furthermore, some ethical problems would also need to be discussed.

The results of our study indicate that 1) asymptomatic gastroesophageal reflux (abnormal esophageal acid exposure and/or reflux esophagitis) is more common than symptomatic gastroesophageal reflux in SO patients; 2) the diagnostic sensitivity of heartburn is very low; and 3) higher BMI is not associated with a greater prevalence of GERD in these patients.

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