

# Effect of Body Mass Index on Gastroesophageal Reflux Disease

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## Abstract

**Background and objectives:** The gastroesophageal reflux disease is a diagnostic and therapeutic challenge in surgery because of its complicated etiology and pathophysiology. Its incidence is increasing parallel with obesity throughout the world. This study tried to find a relation between body mass index and gastroesophageal reflux disease. **Methods:** This study done on one hundred gastroesophageal reflux disease patients in Rizgary teaching hospital, Erbil city Kurdistan region of Iraq from Jan 2014 to June 2014, the study attempted to access the relation between body mass index and symptom severity of gastroesophageal reflux disease through reflux episodes known by number of episodes per week, and also impact of body mass index on endoscopic changes. **Results:** This study was carried out on 100 patients (%45 male) and (%55 female), the mean age  $\pm$  SD of participants was  $12.5 \pm 37.13$  from 75-17 years, the body mass index (BMI) classified to normal  $<25$ , overweight between (30-25), obese patients  $>30$ . The symptoms severity increased with increase body mass index, but its relation with endoscopic findings were not significant. **Conclusions:** The effect of increased body mass index on gastroesophageal reflux disease is an increase in reflux episodes, but its relation to endoscopic finding was not significant.

**Keywords:** Gastroesophageal reflux disease symptoms, body mass index, endoscopic findings.

## Introduction

The Gastroesophageal reflux disease (GERD) was not recognized as a significant clinical problem until the mid-1930s and was not identified as a precipitating cause for esophagitis until after World War II. In the early twenty-first century, it has grown to be a very common problem and now accounts for a majority of esophageal pathology. It is recognized as a chronic disease, and when medical therapy is required, it is often lifelong treatment<sup>1</sup>. The etiology of GERD is complicated. One of the important factors is abnormal competence of lower esophageal sphincter (LES). Normal LES is required preventing the reflux. This is influenced by both its physiological function and its anatomical location relative to the diaphragm and the esophageal hiatus<sup>2</sup>. The competence of the LES and its ability to establish a barrier to reflux depends on several factors. For example: adequate pressure and length, radial symmetry, and motility of the esophagus and stomach. Competent sphincter should be at least 2 cm length and carries a pressure tone between 6 and 26 mm Hg<sup>3</sup>. Gastroesophageal reflux disease (GERD) means the presence of symptoms or mucosal damage from gastroesophageal reflux, it is a common, morbid, and costly medical condition<sup>4</sup>.

The relation between the increase in body mass index and symptom severity of GERD which is identified by a number of heartburn attacks per week was one of the long-standing debates<sup>5</sup>. The increase in body

mass index is associated with an increase of esophageal acid exposure<sup>6</sup>. The parallel rise in GERD and obesity suggests a link between the two. A recent meta-analysis of 20 studies reported a positive association between increasing body mass index (BMI) and the presence of GERD within the USA<sup>6</sup>. Elevated BMI and greater waist circumference are associated with increased intragastric pressure and lower esophageal pressure, the greater likelihood for a hiatal hernia, impaired lower esophageal sphincter function and more frequent, more prolonged and more proximal episodes of esophageal acid exposure<sup>7-12</sup>.

## Patients and methods

The current study was done in Rizgary teaching hospital on one hundred GERD patient from January 2014 to 30<sup>th</sup> June 2014 on different age groups from (17-75) years, 45% were male and 55% were female patients whom they agreed on the study the study was approved by research ethics committee at college of medicine, Hawler medical university.

Diagnosis of patients depends on full history taking and thorough clinical examination with esophagogastro duodenoscopy (OGD). The procedures were explained to the patients and informed verbal consent was taken from each participant, most of these patients had heartburn and acid regurgitation, with variable number of attacks per week, the BMI of patient calculated by measuring the height with meter and

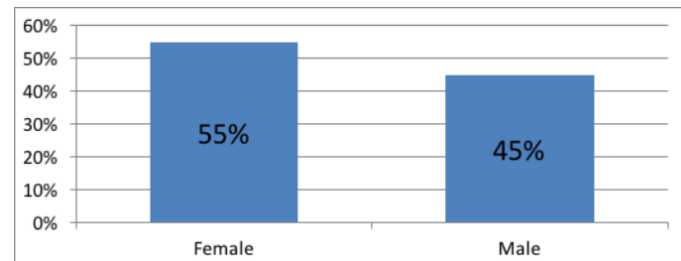
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weight with kg. Patient classified into normal BMI <25 and overweight BMI between 25-30, and obese patients BMI >30. Esophagogastroduodenoscopy had done for all patient with Xylocaine spray to the throat and those who didn't tolerate OGD with this procedure they had been scoped with midazolam 5 mg slow iv injection, and the result was classified to erosive esophagitis or non-erosive esophagitis(NERD), (normal looking OGD) a hiatus hernia and lax lower esophageal sphincter.

Those patients in whom other findings like duodenal ulcer or gastric ulcer, and 2 cases were carcinoma of stomach were excluded from the study, all patients were sent for H pylori Ag in stool, abdominal ultrasound had done for all patients to exclude Gall bladder disease, serum amylase, and serum lipase were done to all patients to exclude pancreatitis and ECG for those above 40 years old to exclude cardiac problems, 24 hour ph studying and manometer was not done because it was not available

## Results

This study was carried out on 100 patients (45% male) and (55% female), Fig1, the mean age  $\pm$  SD of participants was  $37.13 \pm 12.5$  ranged from 17-75 years.



**Figure (1):** Gender distribution of study sample.

Regarding the relation between frequency of heartburn attacks (reflux episodes) and BMI, the current study revealed that the number of heartburn attacks was significantly (<0.001) increasing with increasing BMI, in which 20 patient with BMI >30 had 5 attacks per week, while only 5 patients with BMI <25 had 5 attacks per week, Table 1.

**Table (1):** Relation between BMI and number of heartburn attacks

BMI group	No. and % within BMI group	No. of heartburn attacks					Total
		1.00	2.00	3.00	4.00	5.00	
Normal (<25)	No.	7	19	7	1	5	39
	%	17.9	48.7	17.9	2.6	12.8	100
Overweight (25-29.9)	No.	2	6	9	1	10	28
	%	7.1	21.4	32.1	3.6	35.7	100
Obese (>30)	No.	0	1	6	6	20	33
	%	0.0	3.0	18.2	18.2	60.6	100
Total	No.	9	26	22	8	35	100
	%	9.0	26.0	22.0	8.0	35.0	100

The relation between Increasing BMI and endoscopic finding was not significant (p value=0.749) as 12 patients with normal BMI <25 had hiatus hernia with lax sphincter and esophagitis, comparing to 16 patients with BMI >30 had hiatus hernia with lax sphincter

and esophagitis, 48% of patients on endoscopy were normal looking indicating non-erosive esophagitis (NERD). And 52% of patients showing esophagitis as shown in Table 2

Table (2): Relation between BMI and Endoscopic finding

BMI group	No. and % within BMI group	Endoscopic finding			Normal	Total	P value
		Lax sphincter+ erosive esophagitis	Hiatus her-nia+ lax sphincter+ esophagitis	Normal looking esophagus +lax sphincter			
Normal	No.	5	12	11	11	39	0.749
	%	12.8	30.8	28.2	28.2	100	
Overweight	No.	5	10	7	6	28	
	%	17.9	35.7	25.0	21.4	100	
Obese	No.	4	16	8	5	33	
	%	12.1	48.5	24.2	15.2	100	
Total	No.	14	38	26	22	100	
	%	14.0	38.0	26.0	22.0	100	

**Discussion**

This study demonstrates that obese patients (BMI>30) are associated with more severe symptoms of GERD than those of normal BMI <25 demonstrated by increase in frequency of heartburn attacks per week as shown in table 1, this might be due to the fact that obesity has negative association with lower esophageal sphincter tone leading to increasing esophageal acid exposure<sup>13</sup>. Much evidence exists to support an association between obesity and GERD symptom severity. The pathophysiology of this association is an increase in the intragastric pressure and decrease in intraesophageal pressure with disruption of lower esophagogastric junction structures and that attributed to the crural diaphragm. This study was consistent with study done Hashem El-Serag<sup>14</sup>. Any excess body fat gives excess risk for heartburn; this is true because fat or obesity causes increase in intra-abdominal pressure and increase in intragastric pressure and decrease in intraesophageal pressure with disruption of lower esophageal structure results in reflux of acid to esophagus and esophagitis<sup>15</sup>.

This study is also consistent with a study done in California USA, which they demonstrate positive association between increasing BMI and presence of GERD<sup>16</sup>.

Regarding the relation between increasing BMI and

Endoscopic finding was not significant as shown in Table 2. And there is 48% normal looking endoscopy might be non-erosive esophagitis (NERD), and 52% were showing Esophagitis of variable grades according to Los Angeles classification of esophagitis which is of 4 grades (A.B.C.D). Normal looking OGD might be due to non-erosive esophagitis which called (NERD) or due to the Liberal use of Proton pump inhibitor (PPI) by most of Medical and Paramedical Personnel before diagnosing with endoscopy and this will lead to healing of most cases of esophagitis which shows normal Endoscopy.

The incidence of NERD in Gastroesophageal Reflux disease patients in this study was 48% while in western countries are 50%, and in china, 66.2% showed erosive esophagitis and 38.8% were NERD and in Nigeria 74.4%.as the study was done in Nigeria<sup>17</sup>. Other study done in Budapest revealed a strong correlation between BMI and GERD severity. This finding suggests that obesity and increased BMI is not the only necessarily the primary cause of GERD but it could be a risk factor for more serious mucosal lesions in the esophagus<sup>18</sup>.

**Conclusions**

The obesity and GERD are increasing in the world,

as the increase in BMI is a high-risk factor for the development of gastroesophageal reflux disease with the complication of esophagitis as barrette esophagus and carcinoma of the esophagus, so decreasing weight is strongly advisable for symptomatic improvement of GERD and decreasing the incidence of complications.

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