



Relationship between body mass index and gastroesophageal reflux disease in Mosul City

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ABSTRACT

Background: The gastro-esophageal reflux disease (GERD) considered as a diagnostic and therapeutic challenge. Its incidence is increasing parallel with obesity worldwide. This study tried to find a correlation between the disease and body mass index (BMI).

Aim of study: To identify the correlation between both, GERD and obesity by measuring BMI and related parameters.

Methods: This study done on (100) patients with gastro-esophageal reflux in Ibn-sen teaching hospital, Mosul city of Iraq from 25th of October 2020 until 31st of January 2021. The study endeavored to evaluate the correlation BMI with symptoms' severity of GERD through reflux episodes known by number of episodes per week, and also the influence of BMI and related parameters on endoscopic changes.

Results: This study was carried out on 100 patients (53% male) and (47% female), the mean age \pm SD of participants was 16.4 and mean 42.48 from 17-80 years, the BMI classified to normal 18.5-25 kg/m², overweight between 25-30 kg/m², obese patients >30 kg/m². 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 GERD is an increase in reflux episodes, but its relation to endoscopic finding was not significant.

Keywords:

GERD symptoms, body mass index, endoscopic findings

Introduction:

GERD accounts for at least 9 million office visits to physicians in the USA each year, and annual direct costs for managing GERD exceed \$10 billion. Transient improper relaxation of the lower sphincter is the principal pathophysiologic mechanism in the mainstream of patients with GERD (1).

Pathophysiology:

Reflux is caused by a hiatus hernia when the pressure gradient between the abdominal and thoracic chambers is increased. The tone of the basal sphincter is decreased in certain patients

with gastro-oesophageal reflux disease allowing reflux when intra-abdominal pressure rises (2).

In addition, the mucosal rosette formed by gastric folds of the lining mucosa and the contraction of the crural diaphragm at the LES acting like a pinchcock, prevent acid reflux. A great hiatus hernia may weaken this supportive mechanism (3).

The obesity can promote GERD by a mechanism which is not yet defined, but some competing hypotheses have been proposed. Theory of intra-abdominal pressure proposes that obesity in general, as well as abdominal obesity in

particular, interrupt the integrity of the lower esophageal sphincter ⁽⁴⁾.

Obesity is acknowledged as a potential risk issue for several chronic diseases, such as diabetes mellitus type 2 and cardiovascular diseases. The potential role of obesity's potential role in gastrointestinal problems is unclear. Most recent studies show a correlation of obesity with the appearance of gastrointestinal symptoms, particularly heartburn ⁽⁵⁾.

The eligible patients undergo upper endoscopy to diagnose erosive esophagitis and further classify the degree of erosions according to Los-Angeles's classification. Enrolled patients receive anthropometric measurements to record body weight, body height and waist circumference on the day of enrollment. Two consequences were studied: the symptoms severity of GERD and the Los-Angeles disease Classification of erosive esophagitis. Cases with endoscopically confirmed GERD usually did not undergo pH monitoring ⁽⁶⁾.

The grading system of LA is detailed as follows:

- I- Grade A: Considered as one (or more) mucosal break that not bigger than 5 mm not expands between the peaks of two mucosal folds.
- II- Grade B: One mucosal break (or more) which bigger than 5 mm but does not expand between the two mucosal folds tops.
- III- Grade C: One (or more) mucosal break that is continuous between the two or more tops of mucosa folds, but comprises less than 75% of the esophageal circumference.
- IV- Grade D: One mucosal break (or more) that at least comprises 75% of the whole esophageal diameters ⁽⁷⁾.

Aim of the study:

The current work aim was to examine the impact of obesity and other factors on the incidence , severity, as well as, frequency of reflux clinical symptoms and esophagitis (correlation of obesity with Heartburn).

Patients and Methods

Study design and setting:

To achieve the study aim, cross-sectional design was chosen for primary GERD and conducted in Ibn-Sena Teaching Hospital throughout the period extended from 25th of October 2020 until 31st of January 2021.

Patients:

A total of 100 patients aged 17 – 80 years (mean age = 42.48) with GERD (53 male and 47 female); who attending the Department of Internal Medicine/Centre of Endoscopy/Ibn-sena Teaching Hospital, were incorporated within the study.

1. Inclusion criteria:

- a. Patients presented with symptoms and signs of GERD confirmed by endoscopy.
- b. Age of patients more than 17 years old.

2. Exclusion criteria:

- a. Age less than 17 years old.
- b. Secondary GERD like gastric outlet obstruction.
- c. Alcoholic ,diabetes mellitus , smokers ,hiatus hernia.

Ethical consideration:

- 1. Formal approval was taken from Arabic committee for medical specialization & scientific council for medicine of Arabic Board.
- 2. Formal approval was taken from Ibn-Sena Teaching Hospital authority.
- 3. Verbal approval was taken from patients and/or their kin.

Procedures:

A Pentax EPK-3000 model forward facing gastro-scope with a video display was employed. Cases who gave written consents for the procedure had an endoscopic pre-medication of 10% xylocaine sprayed into the pharynx and a parenteral Midazolam or Diazepam of between 2.5 mg and 5 mg as well as 20 mg Hyoscine to induce smooth muscle relaxation. Cases and controls thereafter had the procedure performed on them. The lower ending of the oesophagus became visualized and any erosive mucosa break was illustrated and graded in accordance to the grading system of Los Angeles (LA).

Data collection:

The data were gathered by direct interview using a special questionnaire. History was taken including age, gender, patient weight in Kg., patient height in cm, BMI, waist circumferences in cm , medical history, social history, drug history,

surgical history, clinical features (presenting symptoms), result of OGD and clinical examination was done including general examination and systemic examination.

Statistical analyses:

The data collected, organized, and summarized in sheets of Excel software 2007. The statistical analysis performed by using IBM-SPSS 26. The normality of these data tested by Shapiro-Wilk analysis, and the nonparametric tests were decided to be chosen. Frequencies, medians, and ranges were calculated. The Spearman correlation was used to find the correlation between the GERD and BMI; 0.9-1.0 considered as strong, 0.7-0.9 high, 0.5-0.7 moderate, 0.3-0.5 low. P-value ≤ 0.05 considered as significant.

Results:

The study was carried out on (100) patients with GERD (53 % male) and (47% female); the patients aged 17 – 80 years with median of (42.0). The GERD (A) , GERD (B), GERD (C), and GERD (D) represent (64%), (27%), (8%), and (1%) respectively.

In our study (32%) was normal weight, (42%) over weight and only (26%) was obese.

I- Demographical variables:

a. Age distribution: figure (2) Shows the age distribution of the study sample and illustrates that the sample distributed with median of (42.0) with range (65.0). The Percentiles 25, 50, and 75 are 28.00, 53.0, and 42.0 respectively.

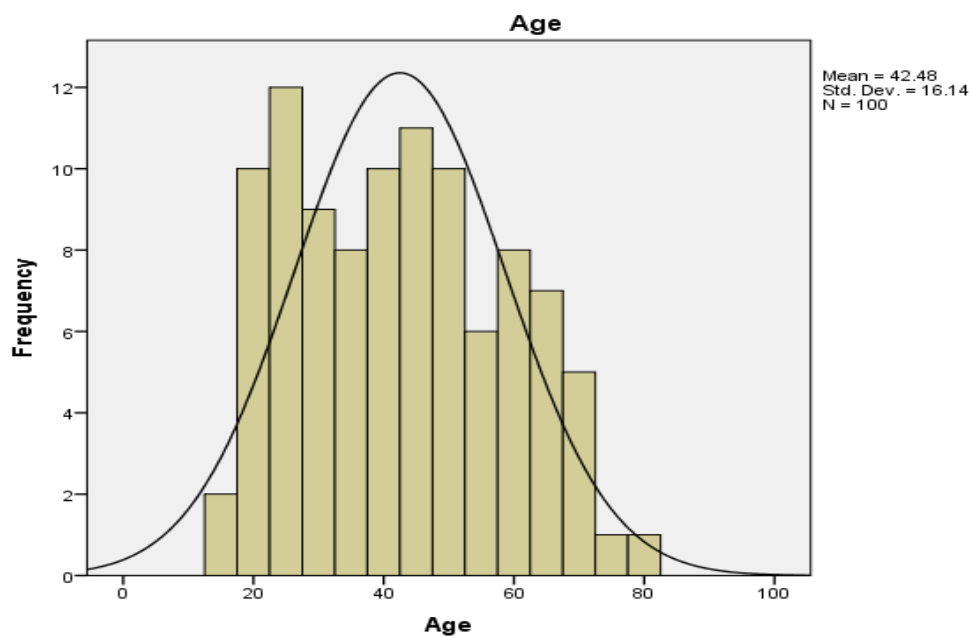


Figure (2): Age distribution of study sample.

b. Distribution of study sample according to sex:

Figure (3) Illustrates the distribution of study sample according to sex, and reveals that 53.0% are males and 47.0% females.

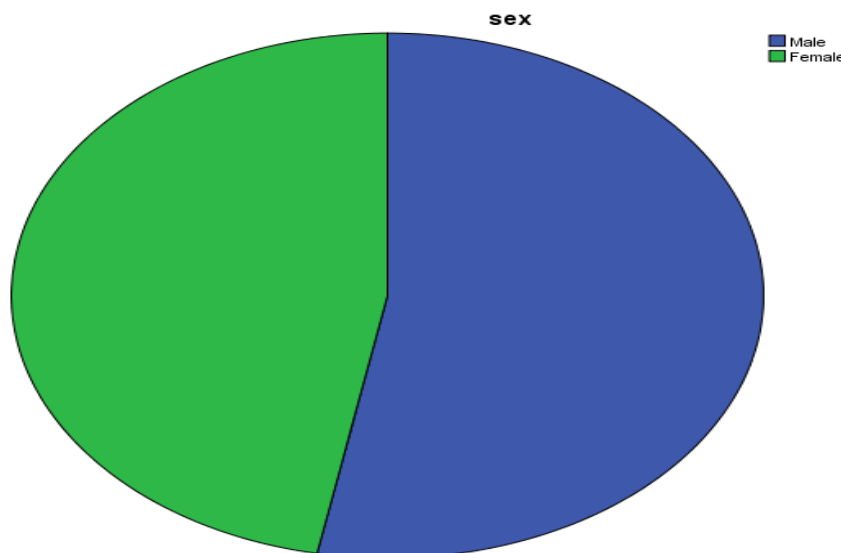


Figure (3): Sex distribution of study sample.

Table (2) demonstrates distribution of the study sample according to BMI and reveals those normal individuals BMI from 18.5 - 25 kg/m² represents 32.0%, out of which the males are 59.4%. The BMI 25-30 kg/m² forms 42.0% of total sample with predominance of males in 61.9%. Above 30 kg/m², the predominance shifts toward females and constitutes 65.0%, 80.0%, and 100.0% of BMI (30-35 kg/m²), (35-40 kg/m²), and (>40 kg/m²) respectively.

Table (2): Distribution of the study sample according to BMI.

BMI	Males n=57		Females n=43		Total n=100	
	No.	%	No.	%	No.	%
Less than 25	19	59.4%	13	40.6%	32	100.0%
25-30	26	61.9%	16	38.1%	42	100.0%
30-35	7	35.0%	13	65.0%	20	100.0%
35-40	1	20.0%	4	80.0%	5	100.0%
More than 40	0	0.0%	1	100.0%	1	100.0%

Table (3) demonstrates distribution of the study sample according to classes of GERD and shows 64.0% of the sample having GERD A; 51.5% are males and 48.5% females. GERD B presents in 59.3% of males and 40.7% of females. GERD C is equally presents in both genders. The GERD D presents in only one female.

Table (3): Distribution of the study sample according to classes of GERD (LA grading of the GERD).

GERD severity	Males n=57		Females n=43		Total n=100	
	No.	%	No.	%	No.	%
GERD A	33	51.5%	31	48.5%	64	100.0%
GERD B	16	59.3%	11	40.7%	27	100.0%
GERD C	4	50.0%	4	50.0%	8	100.0%
GERD D	0	0.0%	1	100.0%	1	100.0%

II-The correlation between BMI and GERD:

Table (4) shows Spearman's rho Correlation between classes of GERD with BMI and reveals **insignificant** association with p=0.472 and correlation coefficient of 0.073.

Table (4): Spearman's rho Correlation between classes of GERD with BMI.

Spearman's rho Correlations		Class	BMI
Class	Correlation Coefficient	1.000	0.073
	Sig. (2-tailed)	.	0.472
BMI	Correlation Coefficient	0.073	1.000
	Sig. (2-tailed)	0.472	.

Table (5) demonstrates Spearman's rho Correlation between BMI and no. of attacks of disease and portrays very highly significant statistical correlation at $p= 0.0001$ with correlation coefficient of moderate strength ($r=0.673$).

Table (5): Spearman's rho Correlation between BMI and no. of attack.

Spearman's rho Correlations		BMI	No. of attack
BMI	Correlation Coefficient	1.000	0.673**
	Sig. (2-tailed)	.	0.0001
No. of attacks	Correlation Coefficient	0.673**	1.000
	Sig. (2-tailed)	0.000	.

**** Correlation is significant at the 0.01 level (2-tailed).**

Discussion:

Some studies propose a relationship of GERD with obesity. However, sources of this relation are not totally clear. These findings are consistent with the description of GERD in most studies Suter M. *et al.*,⁽⁸⁾.

Based on findings of present study, there were insignificant statistical correlation between genders with BMI; this result is comparable to other studies like Jacobson ⁽⁹⁾ which shows matching result.

There were many previous studies as a study of Nilsson M *et al.*, discussing the impact of different genders on GERD. One famous study observed a cohort based on large scale population and established that obese females had an increased risk for GERD symptoms in comparison with obese males, and the risk was maximum in premenopausal females and postmenopausal females receiving estrogen therapy ⁽¹⁰⁾.

In the current work there is no significant statistical correlation between sex (gender) and GERD, as in two large studies in this subject Murray L *et al.*, ⁽³⁾ and Togerson JS *et al.*, ⁽¹¹⁾.

Although the male gender in our study is (53%) in comparison to female (47%), it is mainly due to social habits or religious cause. However,

numerous studies discovered that the increased risk of acid- related esophageal disease among overweight, as well as, the obese persons was neither confounded nor modified by gender as described by Peura D *et al.*, ⁽¹²⁾ According to the age-intervals' distribution of the study sample and illustrates that the sample distributed with median of (42.0). In our study there is no significant statistical correlation between age and GERD. Spearman's rho Correlation between classes of GERD with BMI and reveals insignificant association with $p=0.472$ and correlation coefficient of (0.073).

We see many of patient having class B or C according to Los-Angeles's classification but with little signs, symptoms and no. of attacks of disease, so this classification reveals insignificant association in our study unlike other studies, we think because personal variation in judgment of this classification and advance disease with chronic exposure to acid lead to adaptation to the symptoms.

In our study (32%) of the cases are normal weight and (42%) over weight and only (26%) of the sample will be obese, in patients with GERD, higher BMI was associated with more frequent and more severe heartburn and regurgitation, as

well as with esophagitis, Nilsson M *et al.*,⁽¹⁰⁾ Lagergren J *et al.*,⁽¹³⁾ Hampel H⁽¹⁴⁾.

Spearman's rho Correlation between BMI and number of attacks and portrays show a very highly significant statistical correlation at ($p=0.0001$) with correlation coefficient of moderate strength ($r=0.673$). So, the main correlation is that the severity of the disease affected by higher BMI mainly central obesity.

Result in our study is parallel to the result in other international studies like Lagergren J *et al.*,⁽¹³⁾ Hampel H⁽¹⁴⁾. Up till now no population-based research of the correlation of GERD symptoms and BMI has been conducted in the UK and merely a little of such researches have been performed in other countries. Lagergren J *et al.*,⁽¹⁵⁾ Stanghellini V *et al.*,⁽¹⁶⁾ Locke GR *et al.*,⁽¹⁷⁾ Lee SJ *et al.*,⁽¹⁸⁾ Ruhl CE *et al.*,⁽¹⁹⁾.

Finally, present study showed a higher predominance of GERD in obese population when compared to data of non-obese patients still, it was not demonstrated a positive statistically relevant correlation between increase in BMI and GERD prevalence in the studied obese population, as occurred in other studies⁽²⁰⁻²²⁾.

In obese patient with clinical features of GERD, LRYGB was recommended as it is more successful procedure for improving the symptoms of GERD as it plays significantly an important function in weight reduction without changing the LES anatomy and increasing intra-gastric pressure⁽²³⁾.

Conclusion:

The effect of increased body mass index on GERD is an increase in reflux episodes, but its relation to endoscopic finding was not significant. There is correlation among both BMI and no. of attacks of disease in a very highly significant statistical correlation. Spearman's rho correlation between classes of GERD, age, sex with BMI reveals insignificant association. Obesity consider as aggregating factor for GERD.

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