# A prospective study on the effect of waist circumference on symptom severity of gastroesophageal reflux disease

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## Abstract

**Background and objective:** Gastro esophageal reflux disease is one of the commonest gastrointestinal diseases and its incidence is increasing. There is a real challenge in diagnosis and treatment because of its complication if untreated and its effect on patient daily performance. We tried to find the relation between this disease severity symptom known by the number of heartburn attacks per week and (waist circumference).

**Methods:** A cross-sectional study of 100 patients (55% female and 45% male) diagnosed with gastro esophageal reflux disease in Rizgary Teaching Hospital Erbil city from January 2014 to June 2014. Their ages ranged from 17 to 75 years. The criteria for patient selection depended on history and clinical examination and endoscopy, waist circumference measured with a tape measure in centimeter.

**Results:** The mean age ± SD of participants, was 37.13 ± 12.5 ranged from 17-75 years. Regarding the relation between frequency of heartburn attacks and waist circumflex, the study revealed that the number of heartburn attacks was significantly increasing with increasing waist circumflex, ($P$ <0.001), indicating that there is a strong relation between the increase in waist circumflex and severity of gastro esophageal reflux disease symptoms.

**Conclusion:** Increasing of body weight especially waist circumference increases acid exposure to the esophagus. This affects on gastro esophageal reflux disease symptoms severity and its complication. That is why decreasing body weight should be the first line of treatment which will decrease future complication.

**Keywords:** Waist circumference; Gastroesophageal reflux, Symptom severity.

## Introduction

Gastro esophageal reflux disease (GERD) is regarded as one of most common GIT diseases which accounts for 75% of GIT problems; it is regarded as one of the surgical challenges both in diagnosis and treatment.[1] Simply GERD means reflux of gastro duodenal contents to esophagus which produces symptoms and or mucosal damage. Not every reflux is abnormal. Healthy individuals have occasional episodes of gastro esophageal reflux due to the spontaneous opening of the lower esophageal sphincter (LES). The competence of the LES and its ability to establish a barrier to reflux depends on several factors e,g adequate pressure and length, radial symmetry of lower esophageal sphincter, and motility of the esophagus and stomach to evacuate its contents. A competent sphincter is at least 2 cm length and has a pressure between 6 to 26 mm Hg.[2] Most episodes of physiological reflux occur during postprandial time due to transient lower esophageal sphincter relaxations (TLOSRs). In the early stages of GERD, most pathological reflux occurs as a result of an increased number of TLOSRs rather than a persistent fall in overall sphincter pressure. In more severe GERD, LES pressure tends to be generally low, and this loss of sphincter function seems to be worse if there is loss of an adequate length of intra-abdominal oesophagus.[3] GERD-related symptoms can be classified into

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"typical" symptoms of heartburn, and acid regurgitation, and "atypical" symptoms of cough, hoarseness, asthma, aspiration, and chest pain.[1] In most cases, the diagnosis is assumed rather than proven, and treatment is empirical. Investigation is only required when the diagnosis is in doubt.[3] Investigations like esophago gastroduodeoscopy (OGD) is an essential step in the evaluation of GERD patients and diagnosing its complication. The value of 24hours Ph monitoring and manometer study is to confirm diagnosis in atypical cases and its ability to exclude other diseases.[2] GERD affects 20 percent of western population,[4] although in our country there is no statistical analysis of its prevalence, but it seems that it's also increasing, the increase in incidence are paralleling with increase in body weight.[5] Increase in body weight and body mass index (BMI) more specifically waist circumference leading to increase in intragastric pressure and decrease in intraesophageal pressure which make pressure gradient across lower esophageal sphincter leading to increase esophageal acid exposure[6-13] and when there is increase in acid exposure to lower esophagus produce symptoms of GERD that's why we tried to show such relation in this study.

## Methods

A cross-sectional study was done on one hundred symptomatic GERD patients in Rizgary Teaching Hospital, Erbil city from January 2014 to June 2014 on different age groups (17-75) years, 45% male and 55% female who agreed to participate in this study. The criteria for GERD patient selection made strictly depending on thorough history taking and clinical examination with endoscope, and exclusion criteria done by abdominal ultrasound for all patients to exclude gallbladder disease and serum amylase and serum lipase done for selected patients to exclude pancreatic problem, those patients above forty years old send for electrocardiography( ECG) to exclude cardiac problem, H pylori test by biopsy taking from stomach done for all patients, esophago gastro deudenoscopy procedure explained to patient and done under local anesthesia through xylocain spray to mouth and oropharynx most of the patients tolerated well and the procedure done easily without any complication only 10 patients didn't tolerate we used medazolam 5 mg intravenous. The findings were erosive esophagitis and, hiatus hernia, Lax sphincter and normal OGD, other pathologies which have been diagnosed with peptic ulcer and carcinoma of the stomach have been excluded from this study. The 24h Ph monitoring and manometer not done because it was not available, and most centers do not depend on for diagnosis of GERD unless patient presents with atypical symptoms or planning for surgery, abdominal circumflex was measured with tape measures in centimeters through the waist midway between the lower rib and iliac crest. The normal value for male till 100cm (40 inches) and for female till 87.5cm (35 inches) according to WHO criteria. We tried to find the relation between the waist circumflex (wc) and severity of GERD symptoms demonstrated by the number of heartburn attacks per week. Informed consent had been taken from the patient; the study was approved by Research Ethics Committee in College of Medicine/ Hawler Medical University. The data analysis was done by the statistical package for the social science (version 18).

## Results

One hundred patients were involved in this study the mean age ± SD of participants was 37.13 ± 12.5 ranged from 17-75 years, Regarding the relation between frequency of heartburn attacks per week and waist circumflex, current study revealed that the number of attacks was significantly increasing with increasing waist circumflex, in which 35 patients had 5 attacks perweek with mean waist circumflex of

99.65 ± 17.9 cm, while nine patients who had mean waist circumference ± SD of 81.66 ± 13.1 had only one attack per week, ($P$ <0.001), indicating that there is strong relation between increase in waist circumflex and severity of GERD symptoms as shown in Table 1. This study revealed no statistically significant association between waist circumflex and endoscopic finding, in which 14 patients had lax sphincter and erosive esophagitis, and their mean waist circumflex ±SD was 94.07±12.74, ranged between 70-116 cm, and 38 patient had a hiatal hernia and lax sphincter with erosive esophagitis, their mean waist circumflex ±SD was 96.02±15.58, ranged between 58-128 cm, as shown in Table 2.

**Table 1:** Relation between waist circumference and symptom severity.

| No. of attack per week | N | Mean | SD | SE | 95% Confidence Interval for Mean | | Min. | Max. | *P* value |
| | | | | | Lower Bound | Upper Bound | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 9 | 81.66 | 13.10 | 4.36 | 71.59 | 91.74 | 58.00 | 96.00 | <0.001 |
| 2.00 | 26 | 85.15 | 11.76 | 2.3 | 80.40 | 89.90 | 65.00 | 110.00 | |
| 3.00 | 22 | 90.04 | 12.55 | 2.67 | 84.47 | 95.61 | 62.00 | 110.00 | |
| 4.00 | 8 | 98.62 | 5.78 | 2.04 | 93.79 | 103.45 | 90.00 | 105.00 | |
| 5.00 | 35 | 99.65 | 17.90 | 3.02 | 93.50 | 105.80 | 70.00 | 130.00 | |
| Total | 100 | 92.07 | 15.55 | 1.55 | 88.98 | 95.15 | 58.00 | 130.00 | |

**Table 2:** Relation between waist circumference and endoscopic finding.

| Endoscopic findings | N | Mean | SD | SE | 95% Confidence Interval for Mean | | Min. | Max. | *P* value |
| | | | | | Lower Bound | Upper Bound | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lax sphincter + erosive esophagitis | 14 | 94.07 | 12.74 | 3.40 | 86.71 | 101.43 | 70.0 | 116.0 | 0.079 |
| Hiatus hernia + lax sphincter + esophagitis | 38 | 96.02 | 15.58 | 2.52 | 90.90 | 101.14 | 58.0 | 128.0 | |
| Normal looking esophagus + lax sphincter | 26 | 90.69 | 18.33 | 3.59 | 83.28 | 98.09 | 62.0 | 130.0 | |
| Normal | 22 | 85.59 | 11.56 | 2.46 | 80.46 | 90.71 | 70.0 | 108.0 | |
| Total | 100 | 92.07 | 15.55 | 1.55 | 88.98 | 95.15 | 58.0 | 130.0 | |

This study showed that the mean waist circumference ±SD of the males was 93.68±14.17 while of the females was 90.74±16.6 cm, and this was a statistically insignificant, Table 3.

## Discussion

This study revealed that there is an increase in symptoms severity demonstrated by the number of heartburn attacks (reflux episodes) with an increase in waist circumference, This might be attributed to the fact that increase in waist circumference leading to increase in intragastric pressure and decrease in intraesophageal pressure and increase esophageal acid exposure.[13] This result was consistent with the study done by Corley, Kubo, and Zhao in 2006 in the University of California in the USA,[14] (Abdominal obesity, ethnicity and gastro esophageal reflux disease). There was statistical and qualitative evidence of interaction between ethnicity, abdominal diameter categories and GERD severity symptoms.[14] This result was also consistent with that of a study done by Johnson in Texas in 2007 emphasize the importance of abdominal girth as the key factor in GERD-related symptoms that are associated with overweight and obese. Abdominal diameter is strongly associated with visceral adipose tissue, which is related to more-severe GERD complications such as Barrett esophagus due to increase of acid exposure.[15] Obesity directly affects on motility of gastro intestinal tracts especially esophageal and gastric motility in a manner leading to GERD. A systematic review of the published literature on obesity and gastrointestinal motility was performed. Describe the current understanding of the changes in obesity in the esophagus, stomach, small intestine and colon. Major findings include supportive evidence for increased gastro esophageal reflux disease and esophageal motility disorders in obesity.[16] Regarding the relation between abdominal circumference and endoscopic finding, it was statistically insignificant. This might be due to liberal use of proton pump inhibitor drugs like omeprazole by most of the medical personnel without OGD examination which heals the esophagitis and leads to normal looking esophagus on OGD examination.

## Conclusion

Increase in body weight specially waist circumference cause increase in severity of Gastro-esophageal reflux disease due to increase of acid exposure that's why weight reduction regarded as the first line in treatment of GERD unfortunately both GERD and obesity is increasing worldwide, now a day GERD regarded as one of the most common GIT diseases and once it is diagnosed it is chronic disease with variable and serious complications. As the obesity and GERD parallel increasing worldwide, and the effect of obesity especially waist circumflex on GERD leading to an increase in the symptom severity and more future complications. The study strictly recommends weight reduction specially the waist circumflex.

**Table 3:** waist circumference in male and female patients.

| Gender | N | Mean | SD | SE | 95% Confidence Interval for Mean | | Min | Max | *P* value |
|--------|---|------|-----|-----|--------------|--------------|------|--------|-----------|
| | | | | | Lower Bound | Upper Bound | | | |
| Male | 45 | 93.68 | 14.17 | 2.11 | 89.43 | 97.94 | 70.00 | 130.00 | 0.349 |
| Female | 55 | 90.74 | 16.60 | 2.23 | 86.25 | 95.23 | 58.00 | 130.00 | |
| Total | 100 | 92.07 | 15.55 | 1.55 | 88.98 | 95.15 | 58.00 | 130.00 | |

## ACKNOWLEDGMENT

## Conflicts of interest

The authors report no conflicts of interest.

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