International Journal of Medical Science and Education

An official Publication of Association for Scientific and Medical Education (ASME)

www.ijmse.com

*Original Research Article*

pISSN- 2348 4438 | eISSN-2349- 3208

# RELATIONSHIP BETWEEN ABDOMINAL OBESITY AND GERD: A CASE DESCRIPTIVE STUDY

**Dr. Mohan K. Rao[1], Dr. Prashanth Rai B.[2]**

*[1,2]Assistant Professor, Department of General Medicine, Rajarajeswari Medical College & Hospital, Bangalore, Karnataka, India.*

*Corresponding author - **Dr. Mohan K. Rao**

***Received: 11/01/2018*** ***Revised: 19/02/2018*** ***Accepted: 23/03/2018***

## ABSTRACT

**Background:** Obesity is a global health emergency reaching epidemic proportions all over the world more so in rapidly developing economy like India, posing a serious health risk to the individuals. Obesity is the primary risk factor for diseases like diabetes melitus, Ischaemic heart disease, Gastroesophageal Reflux Disease (GERD), osteoarthritis , cancer etc., GERD is a common medical condition in which the gastric contents move up into the oeasophagus and has multi factorial etio-pathogenesis. **Methods.** A total of 125 patients referred to endocrine OPD with symptoms of GERD were included in this study. The mean age was 47.7 years. The prevalence of obesity was more based on waist circumference (66.6%) and waist-hip ratio (85.3%) than BMI. **Results.** There were 50(66.6%) females vs. 18(36%) males among cases with BMI>23. The number of overweight and obese females had higher mean BMI compared to males. The proportion of females with higher waist hip ratios was higher than those within reference range (11): P value 0.006. There were more females and males with NERD than ERD, p-value: 0.03 and p-value: 0.07 respectively. **Conclusions.**This study has shown us that there is definite relation between abdominal obesity and GERD adding to the growing body of literature. The prevalence of obesity among GERD patients was more based on abdominal girth and waist-hip ratio than BMI. The link between obesity especially abdominal obesity and GERD is stronger in women than men.

**Keywords:** Abdominal Obesity, Oesophagitis, GERD, Overweight, NERD, ERD.

## INTRODUCTION

GERD is defined as a medical condition resulting from reflux of gastric contents into the oesophagus resulting in heartburn, regurgitation, dysphagia, retro-sternal chest discomfort etc., or extra-oesophageal manifestations such as chronic cough, asthma, arrhythmias, recurrent aspiration pneumonia, etc. as in case of atypical GERD. The integrity of the normal gastroesophagal junction is very vital to prevent GERD and it depends on LES tone and the crural diaphragm. Transient LES relaxation is known to cause GERD symptom in 90% of the patients. Several risk factors such as obesity , pregnancy , delayed gastric motility, hyper secretion of gastric acid known to cause GERD. GERD is a common disorder with prevalence of 20% in the US2, in India due to increase prevalence of obesity mainly abdominal resulting from unhealthy life style, rapid urbanization and industrialization. Currently the prevalence of GERD in India is around 8 to 20% **(1-3)**. Increased abdominal fat is an independent risk factor for GERD and hiatus hernia**(4)**. Epidemiologic data demonstrates that over all obesity (BMI > 30) is a risk factor for both GERD

and oesophageal adenocarcinoma**(5,6)**. There is evidence that central abdominal obesity as opposite to elevated BMI is the most important factor for the development of GERD. High levels of leptin, increased circulating inflammatory cytokines from visceral adipose tissue is implicated in the pathogenesis of GERD and Barrett's oesophagus.

**Aims of the study t**o evaluate the association between obesity (BMI),abdominal obesity (as determined by waist circumference, waist to hip ratio) and Gastroesophageal Reflux Disease and to determine the correlation between Obesity and GERD in men & women.

## MATERIALS AND METHODS

A total of 125 patients referred to endocrine OPD with symptoms of GERD were included in this study. The study period was from August 2015 to Feb 2017. Ethical committee approval and consent from the patients were obtained.

**Study design:** Case descriptive analysis of patients with symptoms of GERD, those willing to give the consent were included in the study. Patients with dysmotility disorders, those with history of abdominal surgery, pregnant/lactating woman and those unwilling to give consent were excluded from this study.

**Demographic data:** A total of 125 patients of which 50 were males and 75 females, age ranged from 21 to 78 years with mean age was 47.7 years. Patients were asked for classical symptoms of GERD (such as heart burn, regurgitation, dysphagia, retrosternal chest discomfort, burping, bloating, nausea, vomiting) and a typical symptoms such as asthma, chronic cough, hoarseness of voice, recurrent lower respiratory symptoms, caries teeth, weight loss, upper GI bleed were obtained. Other co-morbidities especially related to obesity were recorded after direct questioning. History regarding dietary habits duration frequency of quantity of meals, excessive intake citrus fruits, coffee, tea, chocolates, aerated soft drinks, smoking including tobacco chewing and alcohol consumptions were recorded. Uses of NSAIDs, oral contraceptives, radiation treatment, previous history of acid peptic disease were also recorded.

**Anthropometric Indices:** Weight was measured using standard weighing machine; height was measured standing erect on the flat surface. Abdominal girth was measured at the level of umbilicus in supine position and hip circumference at the widest part of the buttock. Waist to hip ratio was calculated and BMI was calculated using a formula (weight (Kgs) / height ($M^2$). Patients were then assigned to four categories according to their BMI.

Statistical analysis was done for quantitative variables and expressed as mean $\pm$ standard deviation. The significance of differences in gender according to anthropometric measurements was assessed using chi squared test. P values less <0.05 was considered statistically significant.

## RESULTS

Of the 125 patients presenting with GERD, 62(49.6%) had BMI <23, out of which 17 were underweight and 45 were of normal BMI. 63(50.4%) had BMI >23, among which 25 were overweight and 38 were obese.

**TABLE-1: Table showing BMI distribution**

| BMI | <18.4 | 18.5 - 22.9 | 23 - 24.9 | >25 |
|---|---|---|---|---|
| No. | 17 | 45 | 25 | 38 |
| % | 13.6 | 36 | 20 | 30.4 |

If the data interpretation on basis of gender were considered, females were outnumbered male overweight and obese GERD patients. There were 50(66.6%) females vs. 18(36%) males among GERD cases with BMI>23. Odds ratio for obesity in females was 0.2 with 95% CI 0.2-0.6. Risk ratio was 0.52 with 95% CI 0.3-0.9. Of the 50 males with GERD, 20(40%) had waist circumference>87cm, whereas 50(66.6%) out of 50 females had waist circumference>82. When waist hip ratio was calculated, 23(46%) out of 50 male GERD patients were above 0.9 and 63(84%) out of 75 female GERD patients were above 0.8.

The following table shows the gender based data for those who exceeded normal values of BMI, waist circumference and waist-hip ratio.

**TABLE-2: Table showing comparison between male and female patients exceeding reference range for BMI, waist circumference and waist- hip ratio**

| Gender | Total | BMI >23 % (No.) | WC >87 & 82 cm % (No.) | W-H R >0.9 & 0.8 % (No.) |
|---|---|---|---|---|
| Male | 50 | 36% (18) | 40% (20) | 46% (23) |
| Female | 75 | 66.6 % (50) | 66.6% (50) | 84% (63) |
| P-value | | 0.01 | 0.06 | 0.02 |

The number of male GERD patients who were of <23 BMI(32) were significantly more than those with BMI in overweight or obese category (18): P value 0.008. However the number of female GERD patients who were overweight or obese (50) exceeded those with BMI <23(25) P value 0.02.

The number of male GERD patients with waist circumference<87cms (36) were significantly more than those with higher waist circumference (14): P value 0.03, whereas the number of females with waist circumference>82(50) were more than those within normal range(25) but this value was not statistically significant.

The number of females (50) outnumbered the number of Males (20) in the high waist circumference group; the number of males (30) were more than females(25) in the normal waist circumference group: P value 0.05.The number of male GERD patients who were within reference range for waist- hip ratio (27) were significantly more than those with higher waist-hip ratios (21): P value 0.001. However the number of female GERD patients with higher waist-hip ratios(63)exceeded those within reference range(11): P value 0.006. The number of females (64) were more than males (25) in the higher waist-hip ratio range: P value 0.02 whereas the number of males(22) were more in the normal waist-hip ratio levels compared to females(11): P value 0.01

Upper GI endoscopy was done in 110 patients out of whom there were 45 males and 65 females. Patients were classified as having non erosive(NERD) Vs erosive(ERD) reflux disease.

**TABLE-3: Distribution of female GERD patients based on BMI, waist circumference (WC) and waist-hip ratio (W-H R)**

| BMI | <23 | >23 |
|---|---|---|
| No. | 25 | 50 |
| WC | <82cm | >82cm |
| No. | 27 | 48 |
| W-H R | <0.8 | >0.8 |
| No. | 11 | 64 |

There were more males and females with NERD than ERD, p value: 0.03and p value: 0.07 respectively. Females were less likely to have ERD compared to males. OR: 4.6; p-value: 0.003. 7 out of the 16 males with ERD were smokers.

**TABLE-4: Comparison between male and female patients with NERD Vs. ERD**

| Variables | NERD | ERD |
|---|---|---|
| Total No. | 80 | 20 |
| Male | 26 | 16 |
| Female | 53 | 7 |
| BMI>23 | 55 | 14 |
| Male | 10 | 9 |
| Female | 45 | 5 |

Among NERD patients with BMI > 23, 45(81.8%) were female and 10(18.18%) were males and among ERD patients with BMI > 23, 9(64.2%) were males and 5 (35.71%) were females. Hiatus hernia was present in 16 patients out of which 9 were males and 7 were females and 72% of the male and 100% of the female had BMI >23

**TABLE-5: Distribution of Hiatus hernia**

| Variables | No. | % (no.) BMI>23 | % (no.) WC>87/82 | % (no.) W-H R>0.9/0.8 |
|---|---|---|---|---|
| Total | 16 | 62.5% (10) | 93.3% (14) | 86% (12) |
| Male | 9 | 55% (6) | 77.9% (7) | 72% (6) |
| Female | 7 | 57.1% (4) | 100% (7) | 100% (7) |

**TABLE-6: Distribution of Lax LES**

| Variables | No. | % (no.) BMI>23 | % (no.) WC>87/82 | % (no.) W-H R>0.9/0.8 |
|---|---|---|---|---|
| **Total** | **15** | **46.6% (7)** | **46.6% (7)** | **64.6% (8)** |
| **Male** | **8** | **25% (2)** | **25% (2)** | **52% (4)** |
| **Female** | **7** | **85% (6)** | **80% (6)** | **81% (5)** |

Lax LES was present in 8 males and 7 females, out of which 2 male and 6 females had BMI>23.

## DISCUSSION

**Association between Obesity and GERD:** The results of several studies have suggested that obesity mainly abdominal obesity is an important risk factor for GERD. Visceral fat is more associated with erosive oesophagitis than body mass index (BMI). Physiologically prolonged oesophagel acid exposure have been found to occur more frequently in obese than in people with normal weight. They also tend to have abnormal oesophagial manometric finding such as non-specific motility disorder, nutcracker aesophagus and hypotensive lower oesophagel sphincter are the most common manometric results. Transient relaxation of the lower oesophagial sphinter (TRNES) is also common among obese people. They also tend to have high prevalence of hiatus hernia. The Asia specific epidemiological studies says that GERD is increasing in frequency in Asia because of increased prevalence of obesity, weight loss improves GERD symptoms**(7)**. Many studies such as the INTERHEART have proposed the use of waist to hip ratio and abdominal circumference as markers of obesity rather than BMI.

**Age and Gender Distribution:** The present study involved 125 obese GERD patients in the age group of 21-78, mean age was 47.7 years. 60% were females and 40% were males. Dore MP et al have also reported similar age and gender distribution in their cohort.**(8)** Female preponderance could probably due to the effect of estrogen on lower oesophageal sphincter. **(9-12)**

**BMI and Gender Distribution:**The BMI values in the present study ranged from 16.2-35.8 with mean BMI of 22.9 and median BMI of 23.1 as compared to the BMI range of 16-52 in a western cohort with mean BMI of 27.5 and median BMI 27 in a study by El-Serag et al **(12)**. The lower mean BMI in asian population argues against the use of same BMI cut off values for different ethnic population**(13-18)**. A Korean study which classified GERD patients as per western standards found the distribution to be BMI <25 (68.9%), 25-30(28.7%) and >30(2.4%)**(19)**.

Corley DA et al found an odds ratio of 1.52 for overweight and 2.15 for obese group for risk of GERD in a meta-analysis of studies within the USA**(20)** whereas a study in Asians in Korea found an odds ratio of 1.2 for overweight and 1.9 for obese patients with GERD**(21)**. Female GERD patients in all age groups had higher mean BMI compared to males and also female overweight and obese GERD patients were more than males in the same BMI group. The number of obese females having GERD based on BMI was significantly more than non-obese females 50(66.6%) vs. 25(33.3%). P value 0.02.

**Waist circumference and waist-hip ratio as risk factors for GERD:** The prevalence of obesity was more based on waist circumference (66.6%) and waist-hip ratio (85.3%). Many studies have shown a positive correlation for waist circumference with reflux disease **(12,22,23)**.

**Endoscopy Findings:** The 100 patients who underwent endoscopy, 80% had NERD and 20% ERD. Among NERD patients with BMI > 23, 45(81.8%) were female and 10(18.18%) were males and among ERD patients with BMI > 23, 9(64.2%) were males and 5 (35.71%) were females. This findings was comparable to study done by Gohkl et al**(24)**.Hiatus hernia was present in 16 patients out of which 9 were males and 7 were females and 72% of the male and 100% of the female had BMI >23. This was comparable to study done by Rosaida MS et al**(24).** Moki F et al also found males to be at risk for ERD with odds ratio 2.5 and obesity to be associated with ERD; odds ratio 1.9**(25)** Nocon et al found obese women to be at risk for ERD compared to non obese women with odds ratio 2.5 but in the present study this difference was not statistically significant**.(26)**Zafar et

al found endoscopic severity to correlate with BMI in 203 subjects in a study in Pakistan,**(27)**Wilson et al found BMI to correlate with ERD: odds ratio 1.8**(28).**Some studies have found waist hip ratio to be a risk factor for ERD**(29)** with odds ratio 2.3.

## CONCLUSIONS

This study has shown that there is definite association of abdominal obesity and GERD adding to the growing body of literature. The prevalence of obesity among GERD patients was more based on abdominal girth and waist-hip ratio than BMI. The link between obesity especially abdominal obesity and GERD is stronger in women than men. This study is strong indicator to advocate aggressive weight reduction with specific reference to abdominal obesity.

## REFERENCES


1. Bhatia SJ, Reddy DN, Ghoshal UC, Jayanthi V, Abraham P, Choudhuri G, et al. Epidemiology and symptom profile of gastroesophageal reflux in the Indian population: report of the Indian Society of Gastroenterology task force. Indian J Gastroenterol. 2011;30(3):118-27. doi: 10.1007/s12664-011-0112-x, PMID 21792655, .

2. Sharma PK, Ahuja V, Madan K, Gupta S, Raizada A, Sharma MP. Prevalence, severity, and risk factors of symptomatic gastroesophageal reflux disease among employees of a large hospital in northern India. Indian J Gastroenterol. 2011;30(3):128-34. doi: 10.1007/s12664-010-0065-5, PMID 21061110, .

3. Kumar S, Sharma S, Norboo T, Dolma D, Norboo A, Stobdan T, et al. Population based study to assess prevalence and risk factors of gastroesophageal reflux disease in a high altitude area. Indian J Gastroenterol. 2011;30(3):135-43. doi: 10.1007/s12664-010-0066-4, PMID 21181325,

4. Wilson LJ, Ma W, Hirschowitz BI. Association of obesity with hiatal hernia and oesophagitis. Am J Gastroenterol. 1999;94(10):2840-44. doi: 10.1111/j.1572-0241.1999.01426.x, PMID 10520831,

5. Murray L, Johnston B, Lane A, Harvey I, Donovan J, Nair P, et al. Relationship between body mass and gastro-ooesophageal reflux symptoms: the Bristol Helicobacter Project. Int J Epidemiol. 2003;32(4):645-50. doi: 10.1093/ije/dyg108, PMID 12913045, .

6. Vaishnav B, Bamanikar A, Maske P, Reddy A, Dasgupta S. Gastroesophageal reflux disease and its association with body mass index: clinical and endoscopic study. J Clin Diagn Res. 2017 Apr;11(4):OC01-4. doi: 10.7860/JCDR/2017/24151.9562. PMID 28571180, PMCID PMC5449826.

7. Fock KM, Talley NJ, Fass R, Goh KL, Katelaris P, Hunt R et al. Asia-Pacific consensus on the management of gastroesophageal reflux disease: update. J Gastroenterol Hepatol 2008Jan. 2008;23(1):8-22. doi:10.1111/j.1440-1746.2007.05249.x, PMID 18171339.

8. Dore MP, Maragkoudakis E, Fraley K, Pedroni A, Tadeu V, Realdi G et al. Diet,lifestyle and gender in GERD. Dig Dis Sci. Aug 2008;53(8):2027-32. doi:10.1007/s10620-007-0108-7, PMID 18030622.

9. Nilsson M, Johnsen R, Ye W, Hveem K, Lagergren J. Obesity and estrogen as risk factors for gastroesophageal reflux symptoms. JAMA. 2003;290(1):66-72. doi: 10.1001/jama.290.1.66, PMID 12837713.

10. Piretta L. Prevalence of over weightedness in patients with gastroesophageal reflux. World J Gastroenterol – 14-SEP-2007;13;34:4602-5.

11. Zheng Z, Margolis KL, Liu S, Tinker LF, Ye W, Women's Health Initiative Investigators. Effects of estrogen with and without progestin and obesity on symptomatic gastroesophageal reflux. Gastroenterology - 01-Jul-2008. 2008;135(1):72-81. doi: 10.1053/j.gastro.2008.03.039, PMID 18502208.

12. El-Serag HB, Tran T, Richardson P, Ergun G. Anthropometric correlates of intra gastric pressure. Scand J Gastroenterol. 2006 Aug41(8);41(8):887-91. doi: 10.1080/00365520500535402, PMID 16803686.

13. WHO. Asia Pacific perspective Redefining Obesity Genes WHO2000.

14. Wen CP, David Cheng TY, Tsai SP, Chan HT, Hsu HL, Hsu CC et al. Are Asians at greater mortality risks for being overweight than Caucasians? Redefining obesity for Asians. Public Health Nutr. 2009 Apr;12(4):497-506. doi: 10.1017/S1368980008002802. PMID 18547457.

15. Yusuf S, Hawken S, Ounpuu S, Bautista L, Franzosi MG, Commerford P et al. Obesity and the risk of myocardial infarction in 27,000 participants from 52 countries: a case-control study. Lancet. 2005 Nov 5;366(9497):1640-9. doi: 10.1016/S0140-6736(05)67663-5, PMID 16271645.

16. Deepa M, Pradeepa R, Rema M, Mohan A, Deepa R, Shanthirani S, Mohan V. The Chennai Urban Rural Epidemiology Study (CURES)--study design and methodology (urban component) (CURES-I). J Assoc Physicians India. 2003 Sep;51:863-70. PMID: 14710970.

17. Liu J, Tse LA, Liu Z, Rangarajan S, Hu B, Yin L et al. Predictive values of anthropometric measurements for cardiometabolic risk factors and cardiovascular diseases among 44 048 Chinese. J Am Heart Assoc. 2019 Aug 20;8(16):e010870. doi: 10.1161/JAHA.118.010870. PMID 31394972.

18. Mohan V, Deepa M, Farooq S, Narayan KM, Datta M, Deepa R. Anthropometric cut points for identification of cardiometabolic risk factors in urban Asian Indians. Metabolism. 2007;56(7):961-8. doi: 10.1016/j.metabol.2007.02.009, PMID 17570259.

19. Kang MS. Abdominal obesity is an independent risk factor for erosive esophagitis in a Korean population. J GastroenterolHepatol – 01-OCT-2007; 22. Vol. 10; 1656-61.

20. Corley DA, Kubo A. Body mass index and gastroesophageal reflux disease: a systematic review and meta-analysis. Am J Gastroenterol. 2006;101(11):2619-28. doi: 10.1111/j.1572-0241.2006.00849.x, PMID 16952280.

21. Choi CW, Kim GH, Song CS, Wang SG, Lee BJ, I H et al. Is obesity associated with gastropharyngeal reflux disease? World J Gastroenterol. 2008 Jan 14;14(2):265-71. doi: 10.3748/wjg.14.265, PMID 18186566.

22. Corley DA. Abdominal obesity, ethnicity and gastrooesophageal reflux symptoms. Gut – 01-JUN-2007; 56;6:756-62.

23. Corley DA, Kubo A, Levin TR, Block G, Habel L, Zhao W et al. Abdominal obesity and body mass index as risk factors for Barrett's esophagus. Gastroenterology. 2007;133(1):34-41; quiz 311. doi: 10.1053/j.gastro.2007.04.046, PMID 17631128.

24. Rosaida MS, Goh KL, GERD. esophagitis and NERD in a multiracial Asian population:a prospective endoscopy based study. Eur J Gastroenterol Hepatol May 200416;5:495-501.

25. Moki F, Kusano M, Mizuide M, Shimoyama Y, Kawamura O, Takagi H et al. Association between reflux esophagitis and metabolic syndrome. Aliment Pharmacol Ther. Oct 2007;26(7):1069-75. doi: 10.1111/j.1365-2036.2007.03454.x, PMID 17877514.

26. Nocon M et al. Association of BMI with heartburn, regurgitation and esophagitis: results of the Progression of GERDstudy. J Gastroenterol Hepatol;22(11):2007Nov: 1728-31.

27. Zafar S, ul Haq I, Butt AR, Shafiq F, Mirza HG. Ameed-ur-Rehman. Correlation of endoscopic severity of Gastroesophageal Reflux Disease (GERD) with Body Mass Index (BMI). J Coll

Phys Surg Pak. 2007 Feb;17(2):72-5. PMID 17288850.

28. Wilson LJ, Ma W, Hirschowitz BI. Association of obesity with hiatal hernia and esophagitis. Am J Gastroenterol. 1999;94(10):2840-44. doi: 10.1111/j.1572-0241.1999.01426.x, PMID 10520831.

29. Lee HL, Eun CS, Lee OY, Jeon YC, Sohn JH, Han DS et al. Association between GERD-related erosive esophagitis and obesity. J Clin Gastroenterol. 2008 Jul;42(6):672-5. doi: 10.1097/MCG.0b013e31806daf64, PMID 18360294.