Obesity-An Impactful Risk Factor for Gastro-Oesophageal Reflux Disease

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Abstract

Objective: To determine over-weight and obesity as risk factors for Gastro-oesophageal reflux disease (GERD) in the outpatient department (OPD) of a tertiary care hospital.
Methods: One hundred patients of both genders, presenting with symptoms of GERD were selected as cases and one hundred controls from attendants of various patients not suffering from GERD by random sampling during October 2016 to April 2017. Both the cases and controls were weighed (kilograms) and their heights (centimetres) were measured. Their BMIs (body mass index) were calculated. The cases and controls were then categorised into normal weight, over weight and obese subjects on basis of BMI by WHO criteria. Subjects, with ischaemic heart disease, hypertension, diabetes, peptic ulcer disease those taking NSAIDs (non-steroidal anti-inflammatory drugs), and steroids were excluded.
Results: In this present study, the frequency (the percentage) of male and female was 48.5%, 51.5% respectively. It was found that there were about 52.0% and 48.0% males and females respectively in controls while 45.0% and 55.0% in case. Mean and SD of weight of cases and controls were as 73.17 ± 9.853 kg and 68.78 ± 6.738 kg respectively. The p-value=0.000 showing that there was a significant association between BMI and outcomes i.e. occurrence of GERD (cases and controls).
Conclusion: This study showed that over-weight and obesity were associated with a statistically significant increase in the risk for GERD symptoms i.e. increased by 3 times in all patients, 2 times in males and 7 times in females.

Keywords: Gastro-esophageal reflux, body mass index, overweight, obesity, body weight changes.
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Introduction

Gastro-oesophageal reflux disease (GERD) is linked with obesity as a factor, and if present, implies that losing excess weight may be important in the prevention and treatment of the disease. GERD with hallmark symptoms of heartburn and acid regurgitation, is a common disorder, affecting up to 60% of people at some time during the course of a year and 20% to 30% of persons at least weekly[1]. Frequent or severe symptoms of GERD are associated with time lost from work, impaired health related quality of life, and oesophageal adenocarcinoma, further emphasising the clinical significance of this entity[2].

Frequent symptoms of GERD affect between 10% and 20% of adults in the United States (US). The prevalence of GERD-related complications, in-

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clude erosive oesophagitis, Barrett's oesophagus, and oesophageal adenocarcinoma, which has been steadily increasing in the US and Western Europe. For instance hospitalisations with GERD among veterans increased 10-fold from the 1970s to the 1990s[3]. Similarly, the incidence of oesophageal adenocarcinoma increased 4-fold over the past 20 years[4,5]. The symptoms of GERD are caused by backflow of gastric acid and other gastric contents into the oesophagus due to incompetent barriers at the gastro-oesophageal junction.

When GERD is not treated, serious complications can occur, such as severe chest pain that can mimic a heart attack, oesophageal stricture (a narrowing or obstruction of the oesophagus), bleeding, or a pre-malignant change in the lining of the oesophagus called Barrett's oesophagus. The reasons for the increase in GERD and its complications are not known. Changes in diet, medication use, smoking, alcohol intake and the declining prevalence of Helicobacter pylori infection have been proposed[6,7]. Studies have also hypothesised that the increasing trend of obesity in western populations has paralleled the increase in oesophageal adenocarcinoma and may be an important factor in this change[8,9].

The identification of modifiable risk factors for GERD could potentially have a substantial public health impact. One potential major risk factor is obesity, the prevalence of which had increased markedly in recent decades[10]. Overweight and obesity satisfy several criteria for a causal association with GERD and its complications. Firstly, obese subjects are more sensitive to the presence of acid in the oesophagus. Secondly, hiatal hernia, capable of promoting GERD by several mechanisms, is more prevalent among the obese. Third, obese subjects have increased intra-abdominal pressure that displaces the LES (lower oesophageal stricture) and increases the gastro-oesophageal gradient. Finally, vagal abnormalities associated with obesity may cause a higher output of bile and pancreatic enzymes, which makes the reflux more toxic to the oesophageal mucosa[11]. The National Health Survey of Pakistan (NHSP) conducted from 1990-1994 reported the double burden of disease, i.e. under-nutrition and overweight among adolescents and adults' population. According to this Pakistan National Health Survey (1990-94), the prevalence of obesity among adults (25-44 years) in rural areas of Pakistan was 9% among men and 14% among women. However, the prevalence of obesity was even higher in urban areas i.e. 22% for men and 37% women were obese in urban settings[12]. As obesity is a prevalent condition in Pakistan and we have to deal with the conditions associated with it very often to improve the quality of life in our patients, hence, we chose this topic of obesity, as a risk factor for GERD.

The study aimed to observe the relationship of GERD in normal weight, overweight and obese subjects and to determine whether overweight and obesity were risk factors for GERD. This can help in supporting the evaluation of weight reduction as a potential therapy for GERD.

Patients and Methods

Over a period of six months, from 3rd October 2016 to 2nd April 2017, a case control study, based on non-probability purposive sampling technique was conducted at the Departments of Medicine at Jinnah Medical College Hospital, Karachi.

After informed consent, the data was recorded in identical predesigned proforma by the concerned doctor of the department. Total 200 subjects, 100 subjects with symptoms of GERD (cases) in OPD; and 100 subjects (controls) from attendants of the patients admitted in the hospital and in IPD (In-patient department) not suffering from symptoms of GERD were included in the study as a pilot study. We have no similar study to compare like ours we calculated sample size by keeping confidence level at 90%, confidence interval of 5%, population proportion 50% and population size of 800 (the number of patients admitted in ward in six months). The sample size was calculated to be 204 using World Health Organization (WHO) formula[13]. Subjects, who were suffering from any kind of disease e.g.

ischaemic heart disease, hypertension, diabetes, peptic ulcer disease and subjects, who were taking any medicines, which could cause reflux symptoms e.g. NSAIDs (non-steroidal anti-inflammatory drugs), and steroids for past one month were excluded from the study.

Once all the subjects, both the cases and controls, were selected after taking detailed history for GERD symptoms specifically heartburn and dyspepsia, subjects were then weighed on a weighing scale in kilograms and their heights measured on height chart in metres. They were then categorised according to BMI (body mass index) into normal (BMI: 18 kg/m^2 - 25 kg/m^2), overweight (BMI: 25 to 30 kg/m^2) and obese subjects (BMI>30 kg/m^2) using BMI calculator[14]. The World Health Organization (WHO) criteria for defining obesity were used.

Results

During the study period, it was found that there were about 52 (52.0%) and 48 (48.0%) males and females respectively in controls while there were 45 (45.0%) males and 55 (55.0%) females in cases. The p-value of 0.198 shows there is no significant association between gender and GERD. For our convenience patients ages (years) were grouped into the three age groups i.e. (20-34, 35-54, >54) and these age groups were cross tabulated with presence of GERD and found that 15 (15.0%), 68 (68.0%), and 17 (17.0%) were from controls. Similarly, in cases, frequency and percentages of these groups were found as 10 (10.0%), 68 (68.0%), and 22 (22.0%) respectively (Table 1). This indicated that most of the patients belonged to age group (35-54). The p-value 0.440 shows there was no significant association between age groups and outcomes and presence of GERD.

The weight (kg) of patients was grouped into three groups i.e. (40-59, 60-79, and 80-100) and cross-tabulated between cases and controls. It was found that in controls there were about 4 (4.0%), 85 (85.0%), 11 (11.0%) respectively while in cases there were 6 (6.0%), 65 (65.0%) and 29 (29.0%). The p-value 0.004 indicated that weight had significant association with presence of GERD.

In cases weight range was 40-100 kg and controls 55 - 85 kg respectively with mean ± SD 73.17 ± 9.853 and 68.78 ± 6.738. The results indicate that mean weight was significantly higher in cases than controls (Table 1).

BMI was categorised into three groups i.e. (normal, over-weight, and obese). Frequency in the cases was 42 (42.0%), 51 (51.0%), and 7 (7.0%) respectively, while in controls BMI was 71 (71.0%), 28 (28.0%) and 1 (1.0%) respectively (Table 1). Thus, results indicated that majority of the cases belonged to over-weight and obese category. The p-value=0.000 showing the significant association of BMI with outcome i.e. occurrence of GERD. Hence it can be concluded that being over-weight is a significant risk factor for GERD.

Table 1. Demographic Features of study sample (n= 200)

	Cases (n= 100)	Controls (n= 100)	p-value
Males	45	52	0.198
Females	55	48	0.198
Age (Years) (Mean±SD)	45.83 (10.66)	43.28 (9.46)	0.44
Weight (kg) (Mean±SD)	73.17 (9.85)	70.78 (6.74)	0.004
Normal (n= 113)	71	42	
Over Weight (n= 79)	28	51	
Obese (n= 8)	1	7	
Height (meters) (Mean±SD)	1.69 (0.08)	1.71 (0.08)	0.098
BMI (kg/m^2) (Mean±SD)	27.56 (2.98)	24.1 (2.04)	0.000

p-value= 0.000
BMI= body mass index

Discussion

Gastro-oesophageal reflux disease (GERD) is a multi-factorial disease caused by the combination of excess reflux of gastric juice and impaired clearance of this refluxate from the oesophagus. It is one of the most common gastrointestinal disorder

presenting to the general physician and can lead on to reduction in quality of life greater than that caused by duodenal ulcer, untreated hypertension, mild CCF (congestive cardiac failure), angina or menopause[15]. Obesity is a potentially modifiable risk factor, but existing studies have conflicting results, possibly due to differences in study design, definitions, or populations[16].

We noticed no change in occurrence of GERD symptoms in males or females but a study showed that reflux symptoms and GERD affect women more than men. However, men suffer pathologic changes more frequently[17].

We also imply that quality of life is hampered by presence of GERD[18]. Zafar et al assessed the correlation of endoscopic severity of GERD with BMI of patient. Mean BMI was 27 ± 5.02kg/m^2 SD (range of 18.2-38.3). They concluded that severe GERD was associated with grade C & D endoscopic findings[19]. El-Seraget et al. conducted a study in 2005 and stated that compared to participants without weekly symptoms, a significantly larger proportion of the 118 with these symptoms were either overweight (BMI 25-30kg/m^2) (35% vs 32%) or obese (BMI>30kg/m^2) (39% vs 26%), p=0.004. Relative to those with no oesophageal erosions, those with erosions were more likely to be overweight (39%vs 26%) or obese (41% vs 32%) (p=0.04). Obese participants were 2.5 times as likely as those with normal BMI (<25) to have reflux symptoms or oesophageal erosions[20].

A study done in patients with age at onset of GERD leading to development of Barrett's oesophagus (BE) showed patients with cumulative GERD symptom duration 20 years, those who developed frequent GERD symptoms before the age of 30 years had similar risks of BE to those that developed symptoms later in life[21].

Not all studies showed the same consistent findings. A study failed to show association of GERD and BMI by observing risk factors of adenocarcinoma and gastric cardia. Patients that experienced GERD symptoms at least once per week were selected; they were 66 individuals and showed no relation between BMI and GERD[22]. Another study reported a consistent association between abdominal circumference (independent of BMI) and GERD symptoms in Caucasians, but not in African Americans or Asians[23].

Conclusion

This study showed that over-weight and obesity were associated with a statistically significant increase in the risk for GERD symptoms i.e. increased by three times in all patients, two times in males and seven times in females.

Our study was limited due to loss for follow up otherwise we could have devised an interventional trial for overcoming obesity and see its effect on symptoms.

GERD is a common symptom and in our study, it was found to be associated with obesity. We would recommend conducting trials with interventions like diet, control exercise or bariatric surgery and seeing its impact on GERD.

Conflict of Interest

Authors have no coonflist of interest and no grant/funding from any organisation for this study.

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