Clinical and endoscopic study of dyspepsia in overweight and obese patients

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Abstract

Objectives: Globally, the prevalence of obesity is increasing at an alarming rate. Obese patients often suffer from chronic dyspeptic symptoms. The aim of the study was to know the gross and histologic upper gastrointestinal mucosal changes and the prevalence of Helicobacter Pylori (H. Pylori) infection in overweight and obese dyspeptic patients. Materials and Methods: A cross-sectional, observational study was done on 100 patients with dyspepsia and a body mass index (BMI) of ≥25 kg/m². The study was done between August 2019 and September 2021 at a tertiary care hospital in Maharashtra, India. Statistical Analysis: Chi-square test, Mann-Whitney test, and Fischer exact tests were applied to study the association between categorical variables. A P value of <0.05 was considered statistically significant with a confidence level of 95%. Results: There were 59 males and 41 females. The mean age of the study subjects was 41.95 ± 12.32 years and the age range was 19–67 years. The maximum number of patients (36%) were in the age group of 50–59 years. Hypertension (45%) and type 2 diabetes mellitus (T2DM) (30%) were the common comorbidities present. Heartburn and regurgitation were the most common symptoms, present in 37% and 35% of the subjects, respectively. Inflammatory lesions oesophagitis (28%) and gastritis (43%) were the common findings in upper gastrointestinal endoscopy (UGE). The stomach was the most common site with lesions. On histopathological examination, erosive gastritis (33%) and oesophagitis (28%) were confirmed. A total of 86% of obese subjects had at least one grossly abnormal finding. The prevalence of H. Pylori was 32%. Obese subjects had significantly more abnormal findings on UGE compared to overweight subjects (P < 0.05). Obese patients suffering from type 2 diabetes mellitus had significantly abnormal findings on UGE compared to non-diabetic obese patients (P < 0.05). Obese patients with higher body mass index (BMI) and the presence of H. Pylori infection were more likely to have abnormal UGE findings. Conclusions: Inflammatory and erosive lesions of the stomach and oesophagus are more common in obese dyspeptic patients. UGE should be the investigation of choice and should be performed in overweight and obese patients with dyspepsia to predict and prevent Gastrointestinal (GI) disorders and their related complications.

Keywords: Body mass index, dyspepsia, endoscopy, gastritis, obesity

Introduction

Dyspepsia is a general term that refers to upper abdominal discomfort believed to originate in the upper gastrointestinal tract. It encompasses a variety of more specific symptoms, including bloating, belching, epigastric pain, regurgitation, anorexia, early satiety, and nausea. The family and primary care physicians often come across dyspepsia as the chief complaint from patients across all age groups. Therefore, it is imperative for them to know the causes, contributory factors, and the symptom-based approach to diagnose and treat dyspepsia successfully. The body mass index (in kg/m²) is used to determine obesity. A BMI of 25 kg/m² or greater is defined as overweight, and a BMI of 30 kg/m² or greater is defined as obese.
is a major public health problem on a global scale. It contributes to the risk of developing a variety of chronic diseases, including diabetes, hypertension, and coronary heart disease. In developing countries, obesity is increasing as a result of the adoption of westernized eating habits. In India, obesity affects more than 135 million people.

According to the ICMR INDIA B study, obesity and central obesity prevalence rates in 2015 ranged between 11.8% and 31.3% and 16.9% to 36.3%, respectively.[3] According to studies, obesity is associated with many chronic gastrointestinal (GI) complaints and functional gastrointestinal disorders (FGIDs) such as dyspepsia and irritable bowel syndrome (IBS) and is a risk factor for a variety of gastrointestinal diseases.[3,4]

This finding suggests a possible pathophysiological link between obesity and dyspepsia. However, the evidence for their association is inconclusive.

Upper gastrointestinal endoscopy is recommended as the initial investigation in any patient with long-standing dyspeptic symptoms and is critical in determining whether the patient has organic or functional dyspepsia.

The purpose of this study is to evaluate chronic dyspeptic symptoms in obese patients, as well as their causes, gross appearances of the upper gastrointestinal tract on endoscopy, and histopathological lesions.

Material and Methods

A cross-sectional, observational study was carried out between August 2019 and September 2021 at a tertiary care hospital in Maharashtra, India. Approval was taken from the institutional scientific and ethics committee prior to the commencement of the study. (IEC Ref No IESC/PGS/2019/18). An informed and written consent was taken from all the study participants prior to their enrolment in the study.

Patients above the age of 18 years and having a BMI ≥25 kg/m², who were referred for upper GI endoscopy for symptoms of dyspepsia (heartburn, nausea, vomiting, epigastric pain, and regurgitation) of more than four weeks duration, were included in the study. The patient selection algorithm is shown below [Figure 1].

Following patients were excluded from the study-patients with chronic and habitual alcohol and tobacco addiction; patients with symptomatic gall bladder disease; known case of treated for gastro-oesophageal malignancy; patients with a history of gastrointestinal surgery in the past; those who had used Non-steroidal Anti-inflammatory Drugs (NSAID’s), proton pump inhibitors; H2 blockers and steroids in past four weeks for a period of more than 15 days or taken treatment for H. pylori eradication in past two months and those with secondary obesity.

Figure 1: Patient selection algorithm

A detailed clinical history and general physical examination were done for all cases satisfying the inclusion criteria. GI symptoms like epigastric pain, dysphagia, heartburn, nausea, vomiting, diarrhoea, constipation, etc., were noted. The BMI was calculated using the following formula: Quetelet index – Weight (Kg)/height (Meter)²

Patients were given Short-Form Leeds Dyspepsia Questionnaire (SF-LDQ), and data of SF-LDQ was collected.[5] All the study participants fulfilling the inclusion criteria were subjected to upper GI endoscopy after fasting for 8 hours. Under local anaesthesia (2% lignocaine spray), the patient was laid on the side or back in a comfortable position, and the endoscope was gently passed through the mouth and into the oesophagus, stomach, and duodenum. Gross findings were noted. Biopsies were taken from the oesophagus (lower 1/3rd), stomach (fundus, body, and antrum), and duodenum 2nd part (D2) and sent for histopathological examination. Helicobacter pylori detection was done by histopathological examination of antral biopsy.

Data were entered into Microsoft Excel and analysed using SPSS (Statistical Package for Social Sciences) Software 20. Categorical variables were expressed in terms of frequency and percentage, and continuous were expressed in terms of mean and SD. Association between categorical variables was calculated using Chi-square, Mann-Whitney test, or Fischer exact test. P value < 0.05 was considered as statistically significant at 95% confidence interval.

Results

Out of the total 100 patients, 59 were males (59%) and 41 were females (41%). The male to female ratio was 1.4:1. Table 1 shows the demographic and clinical parameters of the study subjects. The mean age of the study participants was 41.95 ± 12.32 years and the age range was 19–67 years. A maximum of 36% of subjects were in the age group of 50–59 years. A total
of 49% of patients were below the age of 50 years. Out of 100 patients, 45 were overweight, and 55 were obese. The mean BMI was 31.34 ± 3.92 Kg/m². Hypertension (45%) and type 2 diabetes (30%) were the common comorbidities in the study subjects. More than two comorbidities were found in 24%, of which 18% had two comorbidities, and 6% had three comorbidities.

Table 2 shows the responses of the study participants to the SF-LDQ. Symptoms of indigestion and heartburn were present in 59% of cases, and regurgitation and nausea were present in 55% of cases, either every day or between once a week and once a day. Heartburn and regurgitation were the most troublesome symptoms present in 37% and 35% of cases, respectively. The symptoms of dyspepsia interfered with the daily activities in an average of 20% of the patients.

Of the 100 obese and overweight subjects, 86 patients had at least one grossly abnormal finding on UGIE.

Table 3 shows the gross and histopathological findings in the oesophagus, stomach, and duodenum. Gastro-oesophageal Sphincter Incompetence (GSI) was the commonest gross abnormality in the oesophagus (40%). Hiatus hernia was found in 20% of cases. Inflammatory lesions (oesophagitis, gastritis, and duodenitis) were the commonest findings on UGIE. Maximum UGIE findings were in the stomach. Duodenum had the least findings on UGIE. On histopathological examination, erosive and inflammatory lesions of the oesophagus (28%) and stomach (43%) were the most common. Three patients were diagnosed with neoplastic lesions of the oesophagus and the stomach. Biopsies for Histopathological Examination (HPE) were not taken in patients who had gross findings of GSI, hiatus hernia, and gastric or duodenal ulcers. Helicobacter pylori colonisation was detected during histopathological examination of the antral biopsy in 32% of cases. Table 4A shows a correlation between H. pylori infection and grade of obesity (overweight vs. obese). There was no statistically significant association between BMI categories of obesity and H. pylori infection. Table 4B shows the correlation between different grades of obesity and UGIE findings. Patients with BMI of more than 30 kg/m² had statistically significantly more abnormal findings on UGIE than the patients with BMI of <30 kg/m².

Table 5 shows that the UGIE findings were significantly different, and there were gross pathologies in patients with type 2 diabetes mellitus as compared to the patients without Type 2 DM.

Table 6 shows the association of age, gender, BMI, presence of comorbidities, and H. pylori infection with UGIE findings. The UGIE findings were significantly abnormal in patients with higher BMI and H. pylori infection. The presence or the number of comorbidities did not affect the UGIE findings significantly.

**Discussion**

Treating chronic dyspepsia is a challenge because it entails a significant financial burden, patient dissatisfaction, and the risk of misdiagnosis. Often the patients neglect the symptoms and avoid getting investigated, leading to late diagnosis of serious disorders like GI neoplasms.

The mean age of the obese patients was 41.95 ± 12.32 years and the age range was 19–67 years. In a few other studies done to assess dyspepsia by UGIE, the mean age of the study participants was similar to the current study, and the age range varied from 43 ± 15 years. In our study, patients in the 5th and 6th decades of life commonly had dyspepsia as well as were obese. Obesity and dyspepsia are lifestyle disorders nowadays, especially in developing countries like India. Usually, these diseases are common in young and actively working adults. Thus, these diseases can have a grave socioeconomic impact on society.

The majority were males in the current study. In a few other studies too, there was a male preponderance for dyspepsia. In a study by Jaffin BW, et al[8] this sex ratio was reversed. There were 88 females (79%) and only 23 males (21%) of the total 111 participants. In a few other studies, the number of female subjects was more than the males, but all those studies were done on patients with morbid obesity, unlike our study.[7]

In our study, 45% of patients were overweight; 37% had grade 1 obesity, 14% had grade 2 obesity, and 4% had grade 3 obesity classified according to their BMI. In a Mexican study done by Trujillo-Benavides et al.[9] on 326 patients with dyspepsia, 42.2% subjects (n = 135) were overweight, 35.6% (n = 114) had normal weight, and 22.2% (n = 71) were obese. In another study done
Farhanulla Basha, et al.: Upper gastrointestinal endoscopy in obese patients with dyspepsia

The literature contains conflicting findings regarding the relationship between gastrointestinal symptoms like dyspepsia and BMI. In the United States, in a meta-analysis conducted by Corley et al.\[10\], in which they analysed 20 studies done on 18,346 patients with Gastroesophageal Reflux Disease (GERD), a positive correlation was found between increasing BMI and the presence of GERD. They further concluded that this relationship might vary depending on the geographical location and the racial variations in the BMI and that weight reduction should be considered as a potential therapeutic option in the treatment of GERD.\[10\]

Obesity has been shown to increase the risk of morbidity through both established (dyslipidaemia, hypertension, and diabetes mellitus) and novel mechanisms. In the current study, hypertension was the most common comorbidity (45%), followed by T2DM (30%), dyslipidaemia (7%), bronchial asthma (5%), and ischemic heart disease (IHD) (4%). In a similar study conducted by Baysal et al.\[11\] in 127 patients, diabetes mellitus was seen in 36.2% of patients, hypertension in 35.4%, dyslipidaemia in 36.2%, asthma in 5.5%, and IHD in 1.5%. They divided the cases into Group I-those having normal UGIE ($n = 25$ (19.6%)) and those having abnormal UGIE ($n = 102$ (80.4%)). More than or equal to two comorbidities were present in 56 patients (71%), which was in contrast to the finding of the current study, where only 24% of patients had more than or equal to two comorbidities. Obesity is a disease with multisystem involvement. Several lifestyle disorders like hypertension, T2DM, and dyslipidaemia can co-exist with obesity.

In the current study, the answers to the SF-LDQ showed that heartburn and regurgitation were common presenting symptoms. Heartburn, nausea, and indigestion interfered with patients' normal activities and occurred every week in nearly 1/3rd of cases. SF-LDQ is a validated and self-administered questionnaire for the evaluation of persons with dyspepsia to determine the severity and the dominant symptom of dyspepsia. In an SF-LDQ

| Symptoms | A How often have you had this symptom over the last two months? | Frequency (%) | B How often has this symptom interfered with normal activities (eating, sleeping, work, leisure) over the last two months? | Frequency (%) |
|----------|---------------------------------------------------------------|---------------|-----------------------------------------------------------------|---------------|
| Indigestion | Not at all | 8 (8%) | 19 (19%) |
| | Less than once a month | 13 (13%) | 18 (18%) |
| | Between once a month and once a week | 20 (20%) | 30 (30%) |
| | Between once a week and once a day | 31 (31%) | 24 (24%) |
| | Once a day or more | 28 (28%) | 9 (9%) |
| Heartburn | Not at all | 6 (6%) | 9 (9%) |
| | Less than once a month | 7 (7%) | 11 (11%) |
| | Between once a month and once a week | 28 (28%) | 30 (30%) |
| | Between once a week and once a day | 35 (35%) | 31 (31%) |
| | Once a day or more | 24 (24%) | 19 (19%) |
| Regurgitation | Not at all | 5 (5%) | 9 (9%) |
| | Less than once a month | 16 (16%) | 19 (19%) |
| | Between once a month and once a week | 24 (24%) | 20 (20%) |
| | Between once a week and once a day | 26 (26%) | 25 (25%) |
| | Once a day or more | 29 (29%) | 27 (27%) |
| Nausea | Not at all | 6 (6%) | 5 (05%) |
| | Less than once a month | 19 (19%) | 18 (18%) |
| | Between once a month and once a week | 21 (21%) | 24 (24%) |
| | Between once a week and once a day | 34 (34%) | 30 (30%) |
| | Once a day or more | 20 (20%) | 23 (23%) |

Table 2: Short-form Leeds dyspepsia questionnaire findings among study participants

on forty morbidly obese patients with dyspepsia, the average BMI was 46.2 ± 1.7 kg/m².\[8\]
Few studies have shown an association between inflammatory and ulcerative lesions of the stomach and duodenum in obese patients.[12] Obesity is one of the known risk factors for developing erosions in the oesophagus. In a meta-analysis by Singh et al.,[10] it was concluded that individuals with central adiposity had a 1.87-fold higher risk of having erosive oesophagitis compared with normal-weight individuals independent of their body weight. In contrast to this, patients with pear-shaped obesity (fat deposition around the hip area) had an inverse correlation with erosive oesophagitis.[17] Few studies have shown an association between inflammatory and ulcerative lesions of the stomach and duodenum and obesity.[18]

In another cross-sectional study, 196 patients underwent UGIE, and there was a statistically significant increase in erosive oesophagitis in patients with higher BMI.[13] An American study found that inflammatory erosive lesions, especially in the stomach, were more common in obese patients.[12]

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In our study, 86% of participants had pathology in their UGIE findings. A study conducted by Alzahrani et al.[19] found that abnormal UGIE findings were found in 81.5% of patients. In another study done on 1000 patients who underwent UGIE prior to bariatric surgery, 99% of patients had at least one gross abnormal UGIE finding.[20]

The association between the prevalence of helicobacter pylori infection and obesity remains debatable. In the current study, nearly 1/3rd of patients were detected with H. Pylori infection. In a

Table 3: Gross and histopathological findings on UGIE

| UGIE findings                  | Frequency (%) |
|--------------------------------|---------------|
| Oesophagus (Gross)             |               |
| Gastroesophageal sphincter incompetency | 40 (40%)     |
| Oesophagitis                   | 28 (28%)      |
| Mass lesion                    | 1 (1%)        |
| Normal                         | 31 (31%)      |
| Oesophagus (HPE)               |               |
| Erosive oesophagitis           | 28 (28%)      |
| Squamous cell carcinoma        | 1 (1%)        |
| Stomach (Gross)                |               |
| Endoscopic gastritis           | 50 (50%)      |
| Hiatus hernia                  | 20 (20%)      |
| Gastric ulcer                  | 6 (6%)        |
| Mass lesion                    | 2 (2%)        |
| Normal                         | 22 (22%)      |
| Stomach (HPE)                  |               |
| Erosive/haemorrhagic gastritis | 43 (43%)      |
| Adenoma carcinoma of stomach   | 2 (2%)        |
| Duodenum (Gross)               |               |
| Endoscopic duodenitis          | 1 (1%)        |
| Duodenal ulcer                 | 20 (20%)      |
| Normal                         | 79 (79%)      |
| Duodenum (HPE)                 |               |
| Duodenitis                     | 1 (1%)        |

Table 4: Correlation between H. pylori positivity by HPE and grades of obesity

| BMI <30 kg/m² | BMI ≥30 kg/m² | P    |
|---------------|---------------|------|
| A. H. pylori detection by HPE |               |      |
| Positive      | 14            | 18   | 0.8 (Chi-square test) |
| Negative      | 31            | 37   |                   |
| B. UGIE findings |               |      |
| Abnormal      | 65            | 18   | 0.03 (Fisher Exact Test) |
| Normal        | 17            | 0    |                   |

Table 5: Association of Diabetes mellitus (DM) with UGIE findings in study participants

| Diabetes | UGIE findings | P      | Statistical test       |
|----------|---------------|--------|------------------------|
| Normal   | Pathology     | Total  |                        |
| Yes      | 9 (30%)       | 21 (70%) | 30 | 0.007 (Chi-square test) |
| No       | 5 (7.2%)      | 65 (92.8%) | 70 |                   |
| Total    | 14            | 86     | 100                     |

Table 6: Association of different study variables with UGIE findings

| Study variables | UGIE findings | P | Statistical test |
|-----------------|---------------|---|------------------|
|                  | Normal | Abnormal |    |                   |
| Age              | 50.36±11.01 | 49.95±12.54 | 0.5 | Students t-test - NS |
| Gender           |          |           |    | Chi-square test - NS |
| Male             | 9       | 50       |    |                   |
| female           | 5       | 36       |    |                   |
| BMI              | 28.79±1.85 | 31.75±4.03 | 0.006 | Mann-Whitney test – S |
| H. pylori positivity | 0       | 24       | 0.02 | Fisher Exact test - S |
| Comorbidities    | 12      | 58       | 0.21 | Fisher Exact test - NS |
| Number of comorbidities | 10/2 | 36/22       | 0.19 | Fisher Exact test - NS |

H. Pylori infection (7.1%), gastric erosions (5.7%), and duodenitis (3.7%).
few other studies, the prevalence of H. Pylori infection in obese patients was more than 35% (44.9% and 37.5%, respectively).[1,21-24]

There was no significant association between different grades of obesity and the presence of H. Pylori infection in this study. Similar to our findings, in a retrospective study by Díez-Rodríguez R, et al.[22] in 243 consecutive patients who underwent Roux-en-Y gastric bypass, it was found that there was no association between the BMI of patients and the presence of Helicobacter pylori infection. There are conflicting results regarding the association of BMI and Helicobacter pylori infection. H. Pylori significantly affects the gastric endocrine system, including decreased ghrelin production, which results in appetite loss.[23]

This can help in weight reduction in obese patients, and thus it was believed that this organism might prevent obesity. The wide variation in findings across geographical areas in relation to Helicobacter pylori and obesity warrants further investigation using a multicentric study.

On comparing the UGIE findings between overweight and obese patients, we found that obese patients had more chances of having grossly abnormal UGIE than the overweight (P = 0.03). The UGIE abnormalities and the GI symptoms like dyspepsia can be prevented if overweight patients follow the lifestyle changes and dietary modifications for weight reduction.

In our study, abnormal UGIE findings were more common in diabetic obese patients as compared to the non-diabetic obese patients (P < 0.05). Diabetic gastroparesis, autonomic dysfunction, and side effects of oral hypoglycaemic drugs on the stomach may be the reason for the mucosal changes and other abnormal findings in the UGIE. In an Indian study done in 2018 by Vaishnav et al.[24] it was concluded that dyspepsia was common in type 2 diabetes, however, there was no difference in the type of dyspeptic symptoms between diabetics and non-diabetics.

On comparing the various demographic and endoscopic parameters between the patients having normal UGIE and abnormal UGIE, patients having higher BMI and H. Pylori colonisation in the stomach were found to have significant abnormal findings on UGIE. Patient’s age, gender, presence, and number of comorbidities were not associated with abnormal UGIE. In a study by Baysal et al.[11] high BMI and H. Pylori infection were significantly associated with abnormal UGIE, which was similar to current findings. However, advancing age was also associated with abnormal endoscopy, which was in contrast to the current findings.

In the current study, the prevalence of endoscopically proven GERD (erosive oesophagitis) was 28%. The presence of typical reflux symptoms of heartburn and regurgitation with endoscopic findings is diagnostic of GERD. The presence of symptoms with normal GI endoscopy is diagnosed as non-erosive reflux disease (NERD).[25] Only 14% of the obese patients had normal endoscopy. Thus, GERD was more prevalent than NERD in our study. However, in a study by Kim et al., study participants with NERD were significantly more likely to have central obesity than the healthy controls (28.1% vs. 7.9%).[26] The difference may be because of the absence of healthy controls in our study. A diagnosis of NERD requires endoscopy and oesophageal pH monitoring/manometry, which was not done in our study.[27] Further studies with a larger sample size and inclusion of healthy controls may be warranted. The increased prevalence of GERD in obese individuals could be due to an increased gastroesophageal gradient caused by a displaced lower oesophageal sphincter caused by increased intra-abdominal pressure. Vagal abnormalities associated with obesity result in an increase in biliary and pancreatic enzyme output. This increases the toxicity of the gastric refluxate, resulting in increased damage to the oesophageal mucosa and the severity of dyspepsia.[28]

Although the relationship between BMI and upper gastrointestinal diseases has been investigated previously in studies published in the West, to our knowledge, no relevant study has been conducted specifically among obese subjects in South Asia.

The study’s findings that more than four-fifths (86%) of obese patients have at least one endoscopic abnormality, three-quarters have at least one comorbidity, and one-third have H. Pylori positivity suggest that upper gastrointestinal system endoscopy should be performed routinely in obese patients to predict and prevent GI disorder-related complications.

Limitations of the study
Observer’s bias during UGIE, Small sample size.

Conclusion
Obesity is a risk factor for the development of a variety of upper gastrointestinal diseases. Heartburn and regurgitation are the common presenting symptoms. Inflammatory and erosive lesions of the stomach are the most common lesions. Obese patients with type 2 diabetes mellitus, patients with higher BMI and H. Pylori infection were more likely to have abnormal findings on UGIE.

Upper gastrointestinal endoscopy should be the investigation of choice and should be performed in overweight and obese patients with chronic dyspepsia and those with alarm symptoms alongside dyspepsia to predict and prevent complications and serious GI disorders which may cause high morbidity. The primary care physicians, who are the first point of contact for dyspeptic patients with obesity, play an important role in encouraging the patients to go for diagnostic UGIE and in the timely management of dyspepsia so that the patient’s Quality of Life can be improved.

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Conflicts of interest
There are no conflicts of interest.
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