ABSTRACT

Objective. To describe the relation among body mass index (BMI), hiatus hernia and prevalence of gastroesophageal reflux disease, based on Montreal Consensus.

Method. Medical records of 502 obese patients which were submitted to upper gastrointestinal endoscopy before bariatric surgery from January 2004 through December 2008 was reviewed. Age, sex, Body Mass Index (BMI), comorbidities and endoscopic findings were analyzed. Patients were allocated in three groups: BMI of 35 to 39.9 kg/m² in GA; BMI of 40 to 49.9 kg/m² in GB and BMI ≥ 50 kg/m² in GC. Statistical tests used were Pearson product-moment correlation coefficient, Anova and Fisher.

Results. 422 (84%) patients were female. Mean age was 37 years (17-67). H. pylori infection prevalence was 43%. 186 patients (37%) were in GA, 284 (56.5%) in GB and 32 (6.5%) in GC. Global prevalence of gastroesophageal reflux disease was 34.6%, greater in GC (37.5%). Global prevalence of hiatus hernia was 15.9%, greater in GA (17.7%). There was no significant correlation between increases in BMI and prevalence of gastroesophageal reflux disease (p = 0.46) or hiatus hernia (p = 0.93). There was a positive correlation between gastroesophageal reflux disease and hiatus hernia (r = 0.54; r² = 0.29, p < 0.0001) and between age and gastroesophageal reflux disease (r = 0.10; r² = 0.01; p = 0.01). There was no correlation between H. pylori and gastroesophageal reflux disease (r = -0.06; p = 0.13).

Conclusions. Changes in BMI were not shown to alter prevalence of gastroesophageal reflux disease or hiatus hernia. Gastroesophageal reflux disease is more common among patients with hiatus hernia than among those without hiatus hernia. H. pylori infection and gastroesophageal reflux disease were not found to be related.

Key words. Obesity; bariatric surgery; gastroesophageal reflux disease; hiatus hernia.

RESUMO

ANÁLISE DE 502 ENDOSCOPIAS NA AVALIAÇÃO PRÉ-OPERATÓRIA DE PACIENTES A SEREM SUBMETIDOS À CIRURGIA BARIÁTRICA: RELAÇÃO ENTRE DOENÇA DO REFLUXO GASTROESOFÁGICO E ÍNDICE DE MASSA CORPOREA

Objetivo. Descrever a relação entre índices de massa corporal (IMC), hérnia de hiato e a prevalência de doença do refluxo gastroesofágico, baseados no consenso de Montreal.

Método. Revisão de prontuários médicos de 502 pacientes obesos, que foram submetidos a endoscopia digestiva alta antes de cirurgia bariátrica de janeiro de 2004 a dezembro de 2008. Idade, sexo, IMC, comorbidades e achados endoscópicos foram analisados. Os pacientes foram distribuídos em três grupos: aqueles com IMC de 35 a 39,9 kg/m² no grupo A (GA); IMC de 40 a 49,9 kg/m² no grupo B (GB) e IMC ≥ 50 kg/m² no grupo C (GC). Os testes estatísticos utilizados foram coeficiente de correlação de Pearson, Anova e Fisher.

Resultados. Foram do sexo feminino 422 (84%) pacientes. A média de idade foi 37 anos (extremos: 17 a 67). A prevalência de infeção por H. pylori foi 43%. A distribuição foi: 186 pacientes (37%) estavam no GA, 284 (56,5%) no GB e 32 (6,5%) no GC. A prevalência geral de doença do refluxo gastroesofágico foi 34,6%, maior no GC (37,5%). A prevalência geral de hérnia de hiato foi 15,9%, maior no GA (17,7%). Não houve correlação significativa entre IMC e prevalência de doença do refluxo gastroesofágico (p = 0,46) ou hérnia de hiato (p = 0,93). Houve correlação positiva entre doença do refluxo gastroesofágico e hérnia de hiato (r = 0,54; r² = 0,29, p < 0,0001) e entre idade e doença do refluxo gastroesofágico (r = 0,10; r² = 0,01; p = 0,01). Não houve correlação entre infeção pelo H. pylori e doença do refluxo gastroesofágico (r = -0,06; p = 0,13).

Conclusões. Alterações no IMC parecem não influenciar a prevalência de doença do refluxo gastroesofágico ou hérnia de hiato. A doença do refluxo gastroesofágico é mais comum em pacientes com hérnia de hiato do que naqueles sem hérnia de hiato. A infecção por H. pylori não está relacionada à doença do refluxo gastroesofágico.

Palavras-chave. Obesidade; cirurgia bariátrica; doença do refluxo gastroesofágico; hérnia hiatal.
INTRODUCTION

Gastroesophageal reflux disease and obesity are among the most common diseases in western world. About 30% of American population is obese. In Brazil, prevalence of obesity is 10.4% according to the Brazilian Institute of Statistics and Geography (IBGE). Obesity is related to several comorbidities, such as: diabetes mellitus, hypertension, dyslipidemia, cardiovascular diseases, obstructive sleep apnea and gastroesophageal reflux disease. The last affects more than 25% of Americans. Gastroesophageal reflux disease is a condition which develops when the reflux of stomach contents causes troublesome symptoms and/or complications.

Several studies showed a positive relation between body mass index (BMI) and gastroesophageal reflux disease, however there are controversies regarding this relationship. Besides, obese patients are at risk for hiatus hernia, which may increase pre-existent gastroesophageal reflux disease or make it last longer. It is suggested that the increased prevalence of hiatus hernia in the group of obese patients may be due to a higher intra-abdominal pressure and a raised tension in the position of esophageal hiatus. Prevalence of hiatus hernia rises with aging, mostly after 40 years old, as it was suggested by Allison et al.

Whereas hiatus hernia tends to increase prevalence of gastroesophageal reflux disease, *Helicobacter pylori* infection acts as protector factor for esophagitis. This protection effect is related to inflammation in the stomach body (gastritis), which leads to decreased production of chloridric acid. As a result, more infection/inflammation would lead to more severe gastritis and less acid release, which would lower the risk of having gastroesophageal reflux disease or make it less severe. Yet, there is still disagreement among authors on *H. pylori* infection decreasing likelihood of having gastroesophageal reflux disease.

The aim of the present study is to observe if BMI is related to the prevalence of hiatus hernia and gastroesophageal reflux disease; the correlation between gastroesophageal reflux disease, hiatus hernia and the prevalence of *H. pylori* infection in an obese population.

METHOD

Data on 502 obese patients (BMI ≥ 35 kg/m²) undergoing upper gastrointestinal endoscopy before bariatric surgery from January/2004 through December/2008 were reviewed from the database of a bariatric surgery clinic. The following information was reviewed: age, sex, BMI, comorbidities and endoscopic findings – as gastritis, esophagitis, hiatus hernia and presence of *H. pylori* at biopsy. Patients were divided in three groups according to BMI. In group A were included patients with BMI of 35 to 39.9 kg/m²; in group B, patients with BMI of 40 to 49.9 kg/m²; and in group C, patients with BMI ≥ 50 kg/m². As gastroesophageal reflux disease is a symptomatic disease, all patients with a typical reflux syndrome (retroesternal burning or sour regurgitation) or use of proton pump inhibitors for treatment of gastroesophageal reflux disease were classified as having gastroesophageal reflux disease. Prevalence of gastroesophageal reflux disease, hiatus hernia, gastritis and *H. pylori* infection among groups was obtained and its correlations analyzed. The associations between the presence of *H. pylori* and gastroesophageal reflux disease or gastritis were also investigated.

This study was approved by the review board of University of Brasilia Medical School.

Data was analyzed using SPSS13.0 version for windows (SPSS, Inc). Tests used were Pearson product-moment correlation coefficient, Anova and Fisher. P value was considered significant if $p < 0.05$.

RESULTS

Comparative data of studied population is shown on Table. In the study, 80 patients (16%) were male and 422 (84%) female. Mean age was 37 years old (range: 17 to 67 years old). Group A was constituted of 186 patients (37%); group B, of 284 patients (56.5%) and group C, of 32 patients (6.5%).

There was no significant correlation between prevalence of gastroesophageal reflux disease ($p = 0.46$) or prevalence of hiatus hernia ($p = 0.93$) with BMI. Total prevalence of gastroesophageal reflux disease was 34.6%, greater in group C (37.5%). Hiatus hernia was more prevalent in group A (17.7%), with mean prevalence of 15.9%. A positive correlation between gastroesophageal reflux disease and hiatus hernia was observed ($r = 0.54$; $r^2 = 0.29$, $p < 0.0001$). 31 patients (93.9%) in group A, 41 (93.1%) in group B and 3 (100%) patients in group C had gastroesophageal reflux disease and hiatus hernia concomitantly, also without relation to body mass index ($r = -0.0034$; $r^2 = 0.00001$; $p = 0.93$). Then, in group A, 93.9% of patients with hiatus hernia also had gastroesophageal reflux disease; and among those who didn’t have hiatus hernia, only...
20.2% (n = 31) had gastroesophageal reflux disease (p < 0.0001). In group B, this percentage was 93.1% versus 24.6% (n = 59) (p < 0.0001) and in group C it was 100% versus 31% (n = 9) (p = 0.08). In contrast, the prevalence of hiatus hernia in patients with gastroesophageal reflux disease was 50% (n = 31); 41% (n = 41) and 25% (n = 3) in groups A, B and C, respectively (p = 0.22).

There was no statistically significant difference among genders in prevalence of hiatus hernia. Thirteen (16.2%) males presented hiatus hernia against 67 (15.8%) females (p = 1). Notwithstanding, gastroesophageal reflux disease was more prevalent among male gender (p = 0.01), with 38 (47.5%) of men affected; while 136 (32.2%) women were affected. Gastroesophageal reflux disease was more prevalent in age group of 30 to 39 years old, followed by the group of 40 to 49 years old, as showed in Figure. Same distribution occurs for hiatus hernia. There was a positive correlation between age and gastroesophageal reflux disease (r = 0.10; r² = 0.01; p = 0.01) and between age and hiatus hernia (r = 0.14; r² = 0.02; p = 0.0008).

There was a positive correlation between gastritis and H. pylori infection (r = 0.23; r² = 0.05; p < 0.0001). However, correlation between *H. pylori* infection and gastroesophageal reflux disease was not statistically significant (r = -0.06; p = 0.13).

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**Table.** Body mass index, age, gender and prevalence of gastroesophageal reflux disease, hiatus hernia, gastritis and Helicobacter pylori infection in 502 obese patients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group A n = 186</th>
<th>Group B n = 284</th>
<th>Group C n = 32</th>
<th>Total n = 502</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI – kg/m² (mean)</td>
<td>37.9</td>
<td>43.4</td>
<td>54.4</td>
<td>42.1</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Age – years (mean ± SD)</td>
<td>38.5 ± 10.1</td>
<td>36.2 ± 10.6</td>
<td>36.6 ± 10.4</td>
<td>37.1 ± 10.4</td>
<td>0.07</td>
</tr>
<tr>
<td>Gender (M:F)</td>
<td>15:171</td>
<td>54:230</td>
<td>11:21</td>
<td>80:422</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>GERD – n (%)</td>
<td>62 (33.3)</td>
<td>100 (35.2)</td>
<td>12 (37.5)</td>
<td>174 (34.6)</td>
<td>0.8</td>
</tr>
<tr>
<td>Hiatus hernia – n (%)</td>
<td>33 (17.7)</td>
<td>44 (15.4)</td>
<td>3 (9.3)</td>
<td>80 (15.9)</td>
<td>0.46</td>
</tr>
<tr>
<td>Gastritis – n (%)</td>
<td>146 (78.5)</td>
<td>225 (79.2)</td>
<td>25 (78.1)</td>
<td>396 (78.8)</td>
<td>0.97</td>
</tr>
<tr>
<td>H. pylori – n (%)</td>
<td>79 (42.4)</td>
<td>126 (44.3)</td>
<td>11 (34.3)</td>
<td>216 (43)</td>
<td>0.50</td>
</tr>
</tbody>
</table>

DISCUSSION

Some studies suggest a link between obesity and gastroesophageal reflux disease. However, sources of this relation are not totally clear. Locke et al.\textsuperscript{9} showed that obese patients are 2.8 times more likely to suffer from symptoms of reflux than those with normal weight. In the mentioned study, the prevalence of gastroesophageal reflux disease was 34.6%, result very similar to that obtained by Suter et al.,\textsuperscript{4} that affirms a prevalence of 31.4% among 345 obese patients. This higher prevalence may be due to increased intra-abdominal pressure in obese people, which induce to ineffective action of the lower esophageal sphincter in blocking stomach acid reflux. Nilsson et al.\textsuperscript{10} demonstrated a risk 2.7 times greater of developing a new gastroesophageal reflux disease symptom by having an increase of 3.5 points on BMI. This relation between prevalence of gastroesophageal reflux disease and BMI is important to determine how these patients should be managed, since BMI\textsuperscript{11-13} and gastroesophageal reflux disease\textsuperscript{11,14,15} are independent risk factors for esophageal adenocarcinoma.

The present study did not find a statistical significant relation between increase of BMI and gastroesophageal reflux disease, maybe because of the reduced number of patients observed, especially in group C. Furthermore, it was noticed a trend towards increased prevalence of gastroesophageal reflux disease with increases in BMI; as 37.5% of patients in group C presented gastroesophageal reflux disease, a superior percentage compared with the other groups (A, 33.3% and B, 35.2%).

Analyzing the presence of gastroesophageal reflux disease in the group with hiatus hernia, it was observed that gastroesophageal reflux disease was more prevalent in association with hiatus hernia, as it is seen in the percentage in group A that were 93.9% versus 20.2%. There was a statistically significant positive correlation in this situation. This higher prevalence may be explained by the physiopathology of hiatus hernia, in which the esophagus is more susceptible to gastric fluids leading to a bigger chance of lesion occurrence in this region and to consequent development of gastroesophageal reflux disease.

It was also noticed a positive and statistically relevant correlation between the presence of \textit{H. pylori} and gastritis, relation which is well established by literature. This situation is a result of stomach inflammation caused by \textit{H. pylori} and development of gastritis,\textsuperscript{16} which may lead to a gastric ulcer. According to Vicari \textit{et al.},\textsuperscript{7} \textit{H. pylori} is the leading cause of ulcers. Correlation between \textit{H. pylori} and gastroesophageal reflux disease was not statistically significant. These results differ from information of other authors, as for example, the study from El-Serag and Sonnenberg\textsuperscript{6} in which severe \textit{H. pylori} infection caused esophagus protection, explained by decreased production of acids in gastric body.

Finally, present study showed a higher prevalence of gastroesophageal reflux disease in obese population when compared to data of non-obese patients in literature (3-5%).\textsuperscript{17,18} Still, it was not demonstrated a positive statistically relevant correlation between increase in BMI and prevalence of gastroesophageal reflux disease in the studied obese population, as occurred in other studies.\textsuperscript{19} This may have been a limitation secondary to the low number of subjects in group C (n = 32). Nevertheless, these patients should benefit from roux-en-Y gastric bypass and weight loss as suggested by recent studies.\textsuperscript{20,21} Relation between hiatus hernia and gastroesophageal reflux disease was statistically significant, which confirms the higher occurrence of gastroesophageal reflux disease on those with hiatus hernia when compared to patients without hiatus hernia, findings that were also observed by Suter \textit{et al.}\textsuperscript{4} (47.5% versus 15.8%; p < 0.0001).

In conclusion, in obese population assembled in this study, we did not find the presumed protection factor of \textit{H. pylori} on development of gastroesophageal reflux disease, as there was not statistically relevant relation, differing from some information on literature.\textsuperscript{15} This may reveal that even \textit{H. pylori} infection in an obese patient cannot protect esophagus due to presence of aggravating elements, such as higher intra-abdominal pressure, increased presence of hiatus hernia and extended period of temporary distention of lower esophageal sphincter.\textsuperscript{11} Further studies are clearly necessary to establish a final conclusion on this matter.

DISCLOSURES

The authors declare that they have no conflicts of interest. The study was funded by the authors. There was no other form of financial support or resources.

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