

# Prevalence of Asymptomatic Hiatal Hernia in Obese Patient in Routine Upper Gastrointestinal Endoscopy Screening and Correlation with BMI

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## Research article

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# Abstract

**Background** In obese patients, hiatus hernia (HH) can be asymptomatic or it may present with one or few symptoms such as heartburn, nausea, or vomiting. Routine upper gastrointestinal endoscopy is the most frequent method to determine the presence of any abnormalities including hiatus hernia. The aim of this study is to assess the prevalence of asymptomatic hiatal hernia in obese patients in routine upper GI endoscopy assessment and correlation with BMI. **Methods** This was an observational retrospective cohort study conducted at King Fahad Specialist hospital - Buraydah, Qassim, Saudi Arabia. The data were extracted from the medical records and electronic charts of all obese patients who had preoperative upper gastrointestinal endoscopy assessment between January 2017 – December 2019. Data were tabulated in Microsoft Excel and were analyzed using SPSS version 21. **Results** Among the 690 obese patients, the prevalence of HH was 103 yielding an overall percentage of 14.9%. Chi-square test revealed that the abdominal pain ( $X^2=3.885$ ;  $p=0.049$ ), shortness of breath ( $X^2=8.057$ ;  $p=0.005$ ), vomiting ( $X^2=4.302$ ;  $p=0.038$ ), nausea ( $X^2=4.090$ ;  $p=0.043$ ) and other HH symptoms ( $X^2=3.897$ ;  $p=0.048$ ) significantly influenced HH but the BMI level did not ( $X^2=2.126$ ;  $p=0.345$ ). In multivariate regression model, the use of PPI medication (AOR=0.237; CI=0.074 – 0.760;  $p=0.023$ ), while vomiting (AOR=1.722; CI=1.025 – 2.890;  $p=0.040$ ) and nausea (AOR=1.698; CI=1.012 – 2.849;  $p=0.045$ ) significantly increased the risk of HH. **Conclusion** Asymptomatic HH among obese patients is not widely prevalent in our region. The use of PPI medications was found to decrease the symptoms associated with HH while symptoms such as vomiting and nausea increased the risk of HH. However, there was no evidence found linking BMI to HH as shown in this study.

## Introduction

Obesity can affect one's health in many ways including hiatal hernia, i.e., dilation in the diaphragmatic opening through which the esophagus passes. This dilation can cause part or the whole stomach to migrate into the thoracic cavity (1). A prospective study included 1224 participants who were sent for upper gastrointestinal endoscopy and found that 65% of patients with increased waist-to-hip (W/R) ratio present with esophagitis or hiatal hernia (2). Patients with hiatal hernia or esophagitis can show no or few symptoms. It can be found incidentally while investigating digestive disorders using upper gastrointestinal tract endoscopy (3).

Hiatal Hernia is classified as sliding hiatal hernia. This type is the most common type (95% of patients); para-esophageal hiatal hernia is seen when the lower esophageal sphincter remains preserved while the fundus of the stomach herniates through the diaphragm. There is also a mixed type. The fourth type involves the migration of stomach or bowel. The common symptoms of this disease include dysphagia, heartburn, regurgitation, nausea/vomiting, chest pain, or abdominal pain (4). There are multiple risk factors associated with hiatal hernias including age, gender, race, BMI, or any increase in the intra-abdominal pressure (1). Hiatal hernia can be detected using multiple studies. However, only two studies can accurately diagnose hiatal hernia including barium swallow and upper endoscopy (4).

Looking at variations in the incidence and frequency among obese patients and the correlation with asymptomatic hiatal hernia between studies—and considering that the prevalence of asymptomatic hiatal hernia in Al'Qassim province in Saudi Arabia has not been yet established—we conducted a retrospective study on this topic. We then compared the results with other studies conducted inside and outside Saudi Arabia to fully understand the prevalence. The aim of this study was to determine the prevalence of asymptomatic HH in obese patients in routine upper GI endoscopy screening and to assess the relation between BMI and the presence of hiatal hernia.

## Materials And Methods

An observational retrospective cohort study was conducted at King Fahad Specialist hospital - Buraydah, Qassim, Saudi Arabia. The study was approved by the Institutional Review Board (IRB) of National Bioethics Committee (NCBE) at Qassim province. The data were extracted from the medical records and electronic charts of all obese patients who had upper gastrointestinal endoscopy screening between January 2017 – December 2019. Demographic, clinical, and endoscopic data were collected from electronic health records. All obese patients who had upper gastrointestinal endoscopy screening between January 2017 – December 2019 were included. Patients who had a diagnostic upper GIT endoscopy but with no evidence of hiatus hernia were excluded.

Qualitative data were expressed as frequencies and percentages. Quantitative data were expressed as mean and standard deviation. The relationship between hiatal hernia among the basic demographic characteristics and associated diseases of obese patients was established using a Chi square test. A non-parametric test was used for non-normally distributed variables, and the variables were expressed as the median and interquartile range. A multivariate regression analysis was also conducted to determine the independent significant factor associated with HH where the adjusted ratio as well as 95% confidence interval were also reported. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed using Statistical Packages for Software Sciences (SPSS) version 21 Armonk, New York, IBM Corporation, USA.

## Result

**Table 1: Basic demographic data of obese patients.** (n=690)

Study Data	N (%)
Age group	
• 15 – 25 years	182 (26.4%)
• 26 – 35 years	234 (33.9%)
• 36 – 45 years	155 (22.5%)
• >55 years	119 (17.2%)
Gender	
• Male	296 (42.9%)
• Female	394 (57.1%)
Nationality	
• Saudi	686 (99.4%)
• Non-Saudi	04 (0.60%)
BMI Level	
• Severely Obese	146 (21.2%)
• Morbidly Obese	373 (54.1%)
• Super Obese	171 (24.8%)
Use of PPI	
• Yes	12 (01.7%)
• No	678 (98.3%)

The data from a total of 690 obese patients who had upper gastrointestinal screening from January 2017 to December 2019 were analyzed. Table 1 presents the basic demographic characteristics of our patients. The range of patients' age was from 15 to 63 years old (mean: 33.9) with 26 – 35 years being the most common age group (33.9%). Females were slightly more prevalent (57.1%) than women (42.9%). Furthermore, nearly all patients were Saudis (99.4%). More than half of them (54.1%) were classified as morbidly obese. In addition, only 1.7% were using PPI medications.

Figure 1 shows the prevalence of HH among obese patients. The prevalence of HH among obese patients was 14.9% while the majority were negative from HH (85.1%).

In figure 2, the most commonly known symptom related to HH was nausea (15.7%) followed by vomiting and abdominal pain (both 15.5%, each respectively) while shortness of breath was the least frequent complaint (0.7%).

Figure 3 presents chronic diseases associated with obese patients. The most frequently cited chronic disease was diabetes (14.3%) followed by hypothyroidism (9.1%) and finally hypertension and asthma (both at 7% each, respectively).

**Table 2: Relationship between HH among the basic demographic and associated diseases of obese patients and the symptoms related to HH.** (n=690)

Factor	Hiatal Hernia		X <sup>2</sup>	P-value <sup>§</sup>
	Present N (%) (n=103)	Absent N (%) (n=587)		
<b>Age group</b>				
• ≤35 years	66 (64.1%)	350 (59.6%)	0.726	0.394
• >35 years	37 (35.9%)	237 (40.4%)		
<b>Gender</b>				
• Male	50 (48.5%)	246 (41.9%)	1.575	0.209
• Female	53 (51.5%)	341 (58.1%)		
<b>Nationality</b>				
• Saudi	103 (100%)	583 (99.3%)	0.706	0.401
• Non-Saudi	0	04 (0.70%)		
<b>BMI Level</b>				
• Severe Obese	24 (23.3%)	122 (20.8%)	2.126	0.345
• Morbid Obese	49 (47.6%)	324 (55.2%)		
• Super obese	30 (29.1%)	141 (24.0%)		
<b>Use of PPI</b>				
• Yes	05 (04.9%)	07 (01.2%)	6.876	<b>0.009 **</b>
• No	98 (95.1%)	580 (98.8%)		
<b>Chronic diseases *</b>				
• Asthma	04 (03.9%)	44 (07.5%)	1.766	0.184
• DM	09 (08.7%)	90 (15.3%)	3.101	0.078
• HTN	04 (03.9%)	44 (07.5%)	1.766	0.184
• Hypothyroidism	07 (06.8%)	56 (09.5%)	0.795	0.373
<b>Symptoms of Hiatal Hernia *</b>				
• Heartburn	14 (13.6%)	68 (11.6%)	0.337	0.561
• Difficulty in swallowing	07 (06.8%)	21 (03.6%)	2.332	0.127

• Chest pain	07 (06.8%)	21 (03.6%)	2.332	0.127
• Abdominal pain	23 (22.3%)	86 (14.7%)	3.885	0.049 **
• Shortness of breath	03 (02.9%)	02 (0.30%)	8.057	0.005 **
• Vomiting	23 (22.3%)	84 (14.3%)	4.302	0.038 **
• Nausea	23 (22.3%)	85 (14.5%)	4.090	0.043 **
• Others	02 (01.9%)	02 (0.30%)	3.897	0.048 **

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\* Variable with multiple responses.

§ P-value has been calculated using Chi square test.

\*\* Significant at  $p < 0.05$  level.

Chi-square tests were conducted in Table 2 to determine the relationship between HH among the basic demographic data, chronic diseases, and symptoms related to HH. The results show that the use of PPI ( $X^2=6.876$ ;  $p=0.009$ ) and abdominal pain ( $X^2=3.885$ ;  $p=0.049$ ), shortness of breath ( $X^2=8.057$ ;  $p=0.005$ ), vomiting ( $X^2=4.302$ ;  $p=0.038$ ), nausea ( $X^2=4.090$ ;  $p=0.043$ ) and other HH symptoms ( $X^2=3.897$ ;  $p=0.048$ ) have a significant relationship with the presence HH.

**Table 3: Multivariate regression analysis to detect the independent significant predictor associated with hiatal hernia. (n=690)**

Factor	AOR	95% CI	P-value
Use of PPI			
• Yes	0.237	0.074 - 0.760	<b>0.023 **</b>
• No	Ref		
Abdominal pain			
• Yes	1.587	0.920 - 2.739	0.097
• No	Ref		
Shortness of breath			
• Yes	4.987	0.739 - 33.664	0.099
• No	Ref		
Vomiting			
• Yes	1.722	1.025 - 2.890	<b>0.040 **</b>
• No	Ref		
Nausea			
• Yes	1.698	1.012 - 2.849	<b>0.045 **</b>
• No	Ref		
Other symptoms			
• Yes	6.666	0.925 - 48.049	0.060
• No	Ref		

AOR - Adjusted Odds Ratio; CI - Confidence Interval.

\*\* Significant at  $p < 0.05$  level.

Multivariate regression estimates (Table 3) showed the independent significant factor associated with HH. The risk of having HH was likely to decrease as much as 80% for those patients who were using PPI medication (AOR=0.237; CI=0.074 – 0.760;  $p=0.023$ ). Patients with vomiting were nearly two-fold more likely to have HH (AOR=1.722; CI=1.025 – 2.890;  $p=0.040$ ) while patients with nausea had 1.6-fold higher risk (AOR=1.698; CI=1.012 – 2.849;  $p=0.045$ ).

## Discussion



Hiatus hernia is a stomach disorder that involves herniation of the contents of the abdominal cavity. In United States, reports between 2003 and 2006 indicated that HH was the primary and secondary cause of hospitalization in 142 of 10,000 inpatients (5). However, the exact prevalence of HH is difficult to ascertain due to the inherent subjectivity of diagnostic criteria. In this study, we sought to determine the prevalence of asymptomatic HH among obese patients and evaluate whether it has any link to BMI level. The prevalence of asymptomatic HH in this study was low (14.9%). Several papers have documented the prevalence of HH among obese patients or patients with gastrointestinal problems ranging from 9.3% to 37% (2, 6-10). Che et al. (6) recorded the highest prevalence of HH (37%) while Hyun et al. (7), recorded a very low prevalence (9.3%). The prevalence of HH in this study was consistent from the paper of Petersen et al. (8) who reported a prevalence of 17% among patients with gastroesophageal reflux symptoms.

Age and obesity are the most commonly known risk factors of HH (10-12). Compared to people with normal body weight, overweight or obese people had a progressive increase in intra-abdominal pressure, which leads to herniation (13). Wilson and Hirschowitz found that the presence of HH was significantly associated with excessive body weight and the probability of HH increased with each level of BMI (14). This has been validated in a meta-analysis conducted by Menon and Trudgill (15) who observed that the odds ratio for HH in people with a BMI greater than 25 was 1.93 (95% confidence interval 1.10 to 3.39) with risk increasing as the BMI increased. However, in our study, we failed to prove the correlation between BMI and HH ( $\chi^2=2.126$ ;  $p=0.345$ ); age was not a significant predictor in contrast to previous results.

Further analysis univariate determined that the use of PPI medication as well as abdominal pain, shortness of breath, vomiting, nausea, and other symptoms of HH significantly influenced HH. However, after conducting multivariate regression estimates, we found that the use of PPI medication significantly decreased the presence of HH while vomiting and nausea significantly increased the risk of HH. This indicates that the use of PPI was likely a protective factor of HH whereas vomiting and nausea are the significant risk factors associated with HH. Other reports discussed gender and HH and found that males were more frequently diagnosed with HH than females (6,15). In our paper, the relationship between gender did not differ significantly with HH in contrast to previous results.

Moreover, this study suggests that no specific symptoms are attributed to HH. Symptoms related to gastroesophageal reflux including heartburn, regurgitation, or dysphagia were linked to HH due to the occurrence of hernia (16). In our study, the most common symptoms related to HH were nausea (15.7%) followed by vomiting and abdominal pain (each 15.5%); shortness of breath was the least common symptom (0.7%) which is not similar to previous findings.

## Conclusion

Asymptomatic HH among obese patients is not common in Saudi Arabia. The use of PPI medications is a protective factor of HH while symptoms such as vomiting and nausea increased the risk of HH. On the

other hand, there was no evidence linking BMI to HH as shown in this study. More research is needed to validate the prevalence of asymptomatic HH associated with obese patients in our region.

## List Of Abbreviations

HH, Hiatus Hernia

W/R, waist-to-hip

PPI, Proton-pump inhibitors

## Declarations

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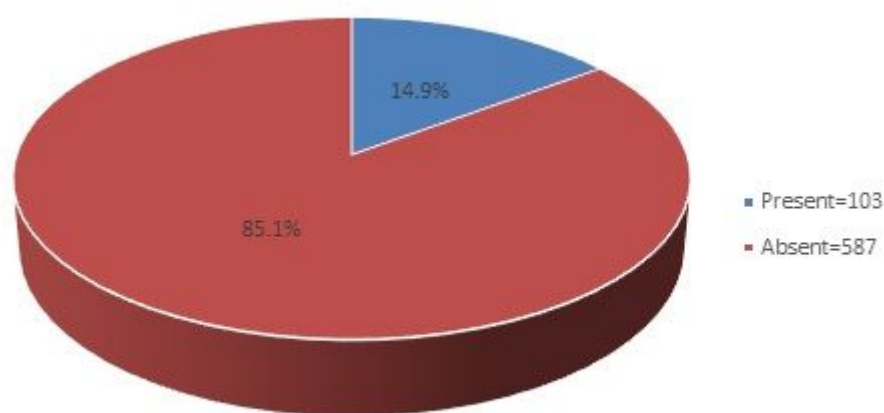
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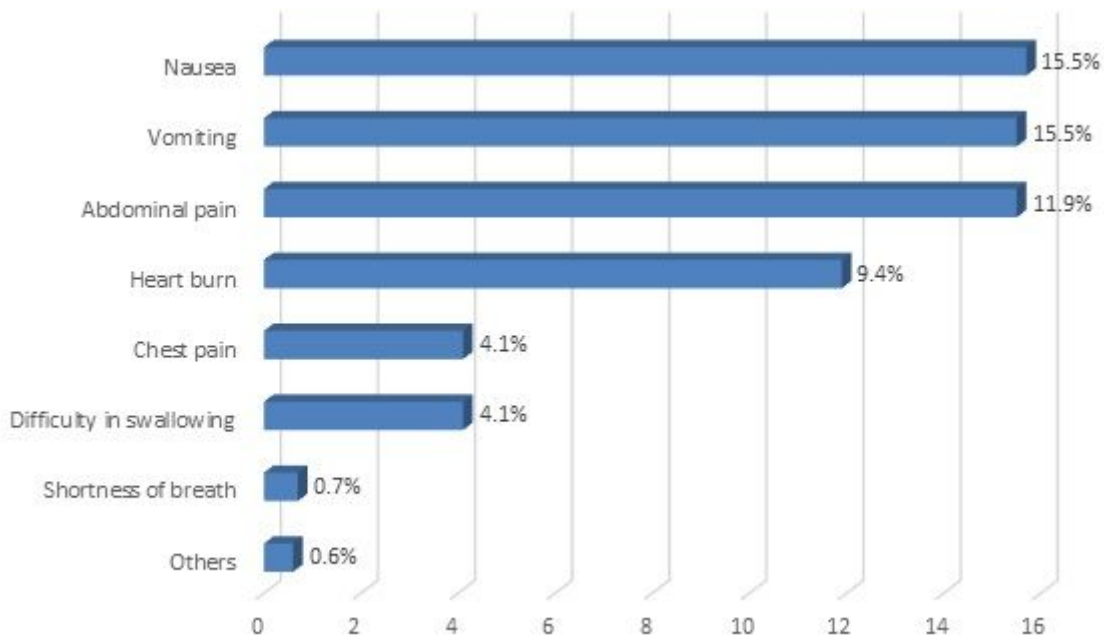
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## Figures



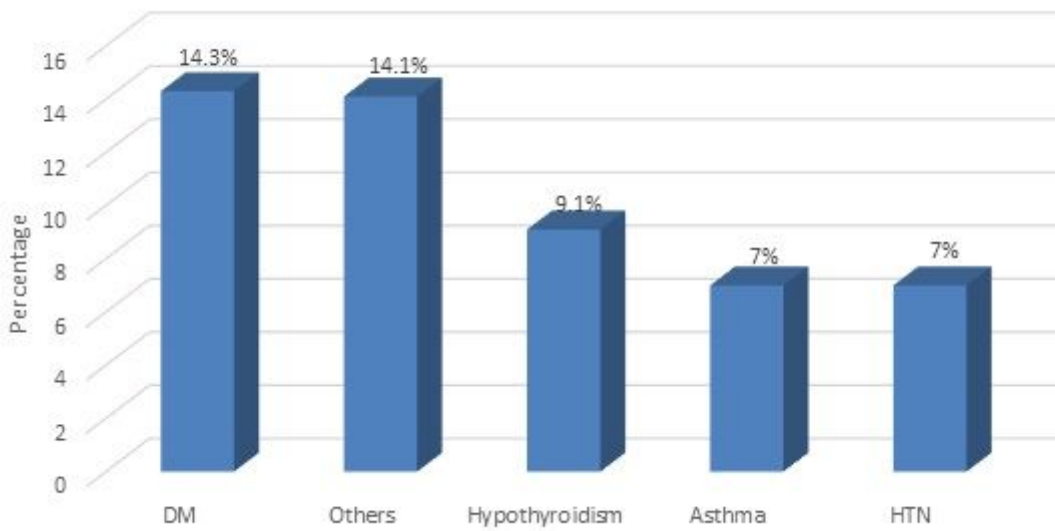
**Figure 1**

Prevalence of HH among obese patients.



**Figure 2**

Symptoms related to hiatal hernia.



**Figure 3**

Chronic diseases of the obese patients.