

Prevalence of Hiatal Hernia in Patients Undergoing Endoscopy with Gastroesophageal Reflux Disease

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hiatal hernia in patients undergoing endoscopy with Gastroesophageal reflux

ABSTRACT

Objective: To determine the prevalence of hiatal hernia (HH) in patients undergoing endoscopy with gastroesophageal reflux disease (GERD).

Study Design: Retrospective observational study

Place and Duration of Study: This study was conducted at the department of Medicine and Gastroenterology, Pakistan Air Force Hospital, Islamabad, Pakistan from January 2023 to July 2024.

Methods: The study included patients aged 18 to 45 years who were referred for diagnostic upper gastrointestinal endoscopy due to symptoms suggestive of GERD. Data were collected using a standardized form that captured demographic information, clinical characteristics, and endoscopic findings. HH was defined as a separation of more than 2 cm between the gastroesophageal junction and the diaphragmatic hiatus, as visualized on endoscopy.

Results: A total of 1,135 patients were included in the study. There were 618 (54.4%) male. The mean age was 35.48±5.81 years, while 685 (60.4%) patients were aged between 31 and 45 years. The mean duration of GERD symptoms was 9.42±3.16 months. HH was identified in 427 (37.6%) patients with GERD. HH was more prevalent among overweight patients ($p<0.001$), rural residence ($p=0.001$), symptom duration of ≥ 6 months ($p<0.001$), smoking (39.8% vs. 26.3%, $p<0.001$), sedentary life-style ($p<0.001$), family history of GERD ($p<0.001$), and diabetes mellitus ($p=0.004$). Regarding presenting features, heartburn ($p<0.001$), regurgitation ($p<0.001$), dysphagia ($p=0.011$), chest pain ($p=0.034$), nausea ($p=0.004$), and vomiting ($p<0.001$) were significantly more prevalent in patients with HH.

Conclusion: This study highlights a high prevalence of HH among patients undergoing endoscopy for GERD, with significant associations with BMI, rural residence, symptom chronicity, smoking, and sedentary behavior.

Key Words: Epigastric pain, gastroesophageal reflux disease, heart burn, hiatal hernia, regurgitation.

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INTRODUCTION

Gastroesophageal reflux disease (GERD) is among the most common gastrointestinal disorders worldwide, with a significant burden on healthcare systems and an adverse impact on patients' quality of life (QOL).¹ Characterized primarily by symptoms of heartburn and acid regurgitation, GERD has an estimated prevalence of 10–20% in Western populations, and appears to be on the rise in many parts of the world, including Asia.²

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GERD represents a spectrum of disease severity, ranging from mild symptomatic reflux to more advanced forms, including erosive esophagitis and Barrett's esophagus, which carry an increased risk of esophageal adenocarcinoma.³ While the majority of GERD patients are managed effectively with lifestyle modifications and pharmacotherapy, particularly proton-pump inhibitors (PPIs), refractory cases often prompt further diagnostic evaluation, including endoscopy, to identify potential anatomical contributors, such as HH.^{4,5}

Patients with a HH may present with more severe GERD symptoms and complications, such as esophagitis, stricture formation, and Barrett's esophagus.^{6,7} Among patients with GERD, the reported prevalence of HH is high, estimated at 30–45%.^{8,9} This variability underscores the influence of population demographics, study methodology, and the clinical presentation of GERD on prevalence estimates.

Endoscopy remains the cornerstone diagnostic modality for evaluating GERD, particularly in patients with refractory symptoms, alarm features, or when

complications such as esophagitis or Barrett's esophagus are suspected.¹⁰ It is also the primary tool for diagnosing HH, which is identified by the displacement of the gastroesophageal junction above the diaphragmatic hiatus during the procedure. In clinical practice, the diagnosis of HH during endoscopy has implications for the management of GERD, as it may influence therapeutic decisions, including the consideration of surgical intervention in selected patients.

Despite the clinical relevance of HH in GERD, data on its prevalence in specific patient populations remain limited. Data on younger populations, particularly those aged 18–45 years, are sparse. This age group represents an important subset of GERD patients, as they are more likely to present with non-erosive reflux disease (NERD) and have a different natural history of disease progression compared to older adults. Understanding the prevalence of HH in this demographic is essential for tailoring diagnostic and therapeutic approaches to their unique clinical characteristics. This study aims to provide insights into the burden of HH in a population that is often underrepresented in GERD research. This study also sought to explore whether demographic or clinical factors, such as gender or symptom severity, are associated with the presence of HH in this population. By identifying patients with HH early in the course of their disease, we may be able to prevent these complications and improve long-term outcomes. The main objective of this study was to determine the prevalence of HH in patients undergoing endoscopy with GERD.

METHODS

This retrospective observational study was conducted at the department of Medicine and Gastroenterology, Pakistan Air Force Hospital, Islamabad, Pakistan during January 2023 to July 2024. Approval from Institutional Ethics Committee was obtained (letter number: 241211-A). The study included patients aged 18 to 45 years who were referred for diagnostic upper gastrointestinal endoscopy due to symptoms suggestive of GERD, including heartburn, regurgitation, and epigastric discomfort. Inclusion criteria consisted of male and female patients with no prior history of esophageal surgery. Exclusion criteria included patients with a known history of HH, major comorbidities affecting the gastrointestinal tract (e.g., esophageal cancer or peptic ulcer disease), or recent use of medications (e.g., PPIs or H2-receptor antagonists) that could obscure endoscopic findings. Patients with incomplete or inadequate endoscopic evaluations were excluded.

Data were collected using a standardized form that captured demographic information, clinical characteristics, and endoscopic findings. All endoscopies were performed using a high-definition video endoscope. The procedure was carried out using

propofol as sedation agent using standard sedation protocols administered by a qualified anesthesiologist. Findings were recorded in real-time and subsequently reviewed to ensure consistency and accuracy. HH was defined as a separation of more than 2 cm between the gastroesophageal junction and the diaphragmatic hiatus, as visualized on endoscopy.¹¹ The presence of a HH was documented by an experienced gastroenterologist. Physical activity was categorized into three levels based on intensity and duration: sedentary, moderate, and active. Sedentary activity involved minimal movement, primarily sitting or lying down, with less than 150 minutes of moderate activity per week. Moderate activity included regular moderate-intensity exercises, such as brisk walking or light cycling, totaling 150 to 300 minutes per week. Active individuals engaged in vigorous activities, such as running or aerobics, exceeding 300 minutes of moderate activity or 150 minutes of vigorous activity weekly.

Data analysis was performed using IBM-SPSS Statistics, version 26.0. Continuous variables were summarized as means with standard deviations, while categorical variables were presented as frequencies and percentages. Comparisons were made applying chi-square test taking $p < 0.05$ as significant.

RESULTS

Table No. 1: Characteristics of patients (n=1135)

Characteristics		Frequency (%)
Gender	Male	618 (54.4%)
	Female	517 (45.6%)
Age (years)	18-30	450 (39.6%)
	31-45	685 (60.4%)
Body mass index (kg/m ²)	Underweight (<18.5)	63 (5.6%)
	Normal (18.5-22.9)	412 (36.3%)
	Overweight (23-27.4)	448 (39.5%)
	Obese (>27.4)	212 (18.7%)
Residence	Rural	704 (62.0%)
	Urban	431 (38.0%)
Duration of symptoms (months)	<6	483 (42.6%)
	≥6	652 (57.4%)
History of smoking	Yes	356 (31.4%)
	No	779 (68.6%)
Physical activity	Sedentary	482 (42.5%)
	Moderate	413 (36.4%)
	Active	240 (21.1%)
Family history of GERD	Yes	210 (18.5%)
	No	925 (81.5%)
Comorbidities	Diabetes mellitus	98 (8.6%)
	Hypertension	105 (9.3%)

A total of 1,135 patients were included in the study. There were 618 (54.4%) male. The mean age was 35.48 ± 5.81 years, while 685 (60.4%) patients were aged between 31 and 45 years. There were 448 (39.5%) patients who were overweight, while 212 (18.7%) were obese. Residential affiliation of 704 (62.0%) patients was rural. The mean duration of GERD symptoms was 9.42 ± 3.16 months, while symptoms duration was ≥ 6 months in 652 (57.4%) patients. Sedentary lifestyle was present in 482 (42.5%) patients. Family history of GERD was noted in 210 (18.5%) patients (table-1).

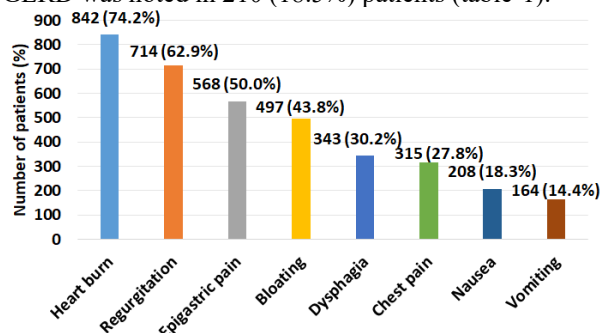


Figure No. 1: Presenting features/complaints of patients with GERD (n=1135)

Heart burn, regurgitation, epigastric pain, and bloating were the most frequent presenting features/complaints,

noted in 842 (74.2%), 714 (62.9%), 568 (50.0%), and 497 (43.8%) patients, respectively (figure-1).

HH was identified in 427 (37.6%) patients with GERD. HH was more prevalent among overweight patients (50.4% vs. 32.9%) and less prevalent in those with a normal BMI (25.8% vs. 42.7%, $p < 0.001$). Rural residence was associated with a higher prevalence of HH (68.0% vs. 58.5%, $p = 0.001$). Patients with a symptom duration of ≥ 6 months were significantly more likely to have HH (69.1% vs. 50.4%, $p < 0.001$). Smoking was strongly associated with HH (39.8% vs. 26.3%, $p < 0.001$). Sedentary patients were more likely to have HH compared to those with moderate or active lifestyles (49.2% vs. 35.1% and 15.7%, $p < 0.001$). A family history of GERD was significantly associated with HH (23.4% vs. 15.5%, $p < 0.001$). Diabetes mellitus was significantly more frequent in patients with HH (11.7% vs. 6.8%, $p = 0.004$). Table-2 is showing details about the association of various study variables with the presence of HH in patients with GERD.

Regarding presenting features, heartburn (40.6%, $p < 0.001$) and regurgitation (44.1%, $p < 0.001$) were significantly more commonly associated symptoms in patients with HH. Dysphagia was also significantly more prevalent in patients with HH (43.1% vs. 56.9%, $p = 0.011$). Chest pain (52.5% vs. 57.5%, $p = 0.034$), and nausea (46.2% vs. 53.8%, $p = 0.004$), were also significantly associated with HH, as shown in table-3.

Table No. 2: Association of hiatal hernia with respect to study variables

Characteristics		Hiatal hernia		P-value
		Yes (n=427)	No (n=708)	
Gender	Male	246 (57.6%)	372 (52.5%)	0.097
	Female	181 (42.4%)	336 (47.5%)	
Age (years)	18-30	161 (37.7%)	289 (40.8%)	0.299
	31-45	266 (62.3%)	419 (59.2%)	
Body mass index (kg/m ²)	Underweight (<18.5)	20 (4.7%)	43 (6.1%)	<0.001
	Normal (18.5-22.9)	110 (25.8%)	302 (42.7%)	
	Overweight (23-27.4)	215 (50.4%)	233 (32.9%)	
	Obese (>27.4)	82 (19.2%)	130 (18.3%)	
Residence	Rural	290 (68.0%)	414 (58.5%)	0.001
	Urban	137 (32.0%)	294 (41.5%)	
Duration of symptoms (months)	<6	132 (30.9%)	351 (49.6%)	<0.001
	≥ 6	295 (69.1%)	357 (50.4%)	
History of smoking	Yes	170 (39.8%)	186 (26.3%)	<0.001
	No	257 (60.2%)	522 (73.7%)	
Physical activity	Sedentary	210 (49.2%)	272 (38.4%)	<0.001
	Moderate	150 (35.1%)	263 (37.2%)	
	Active	67 (15.7%)	173 (24.4%)	
Family history of GERD	Yes	100 (23.4%)	110 (15.5%)	<0.001
	No	327 (76.6%)	598 (84.5%)	
Comorbidities	Diabetes mellitus	50 (11.7%)	48 (6.8%)	0.004
	Hypertension	47 (11.0%)	58 (8.2%)	0.112

Table No. 3: Association of hiatal hernia with presenting features/symptoms in patients with GERD (N=1135)

Presenting features/symptoms	Hiatal hernia		P-values
	Yes (n=427)	No (n=708)	
Heart burn	342 (40.6%)	500 (59.4%)	<0.001
Regurgitation	315 (44.1%)	399 (55.9%)	<0.001
Epigastric pain	218 (38.4%)	350 (61.6%)	0.597
Bloating	183 (36.8%)	314 (63.2%)	0.623
Dysphagia	148 (43.1%)	195 (56.9%)	0.011
Chest pain	134 (52.5%)	181 (57.5%)	0.034
Nausea	96 (46.2%)	112 (53.8%)	0.004
Vomiting	89 (54.3%)	75 (45.7%)	<0.001

DISCUSSION

In this study of 1,135 patients, the prevalence of HH was 37.6%. This is higher than the 28.9% prevalence reported by Alsahafi et al in an endoscopy-based study from a large tertiary care center but consistent with their findings of an increased prevalence among patients evaluated for GERD-related symptoms (48.6%).¹² Teerakanok et al. found a slightly higher prevalence of HH (40%) in a population undergoing esophageal capsule endoscopy for reflux symptoms.¹³ Abu-Freha et al in a multicentric study examining 162608 endoscopic records reported the prevalence of HH as 24.4%.¹⁴ Variations in prevalence rates of HH in GERD could be attributable to differences in study populations, diagnostic modalities, or geographic settings.

Alsahafi et al. reported no significant association between HH and BMI, while our study identified a strong relationship, with a prevalence of 50.4% in overweight patients compared to 25.8% in those with normal BMI ($p < 0.001$).¹² This disparity may reflect the more stringent BMI cutoffs applied in our South Asian population, where lower BMI thresholds are often used to define overweight and obesity due to differences in body composition. Our study also found a significant association between HH and rural residence (68.0% vs. 58.5%, $p = 0.001$). The rural association in our cohort might be explained by dietary practices, delayed healthcare access, or underdiagnosis in urban areas.¹⁵

In terms of symptom duration, patients with GERD symptoms for ≥ 6 months were significantly more likely to have HH (69.1% vs. 30.9%, $p < 0.001$), consistent with the chronicity of GERD symptoms as a

contributing factor to the development of anatomical changes at the gastroesophageal junction.^{16,11} Smoking was strongly associated with HH (39.8% vs. 26.3%, $p < 0.001$). This finding aligns with others highlighting the role of smoking in reducing lower esophageal sphincter pressure and increasing reflux episodes.¹⁸ Physical activity also emerged as a significant factor; sedentary individuals had a higher prevalence of HH (49.2% vs. 15.7% in active individuals, $p < 0.001$). This supports existing evidence suggesting that sedentary behavior exacerbates intra-abdominal pressure, contributing to HH development.^{19,20} The lack of association between HH and age in our study ($p = 0.299$) contrasts with reports from Abu-Freha et al., where older age was a significant predictor (odds ratio 1.03).¹⁴ This difference may result from the narrower age range (18–45 years) in our cohort, limiting our ability to detect age-related effects.

Symptomatically, heartburn (40.6%) and regurgitation (44.1%) were the most common complaints in patients with HH, both significantly more prevalent compared to those without HH ($p < 0.001$). Similar results were reported by a researcher, where 32% of patients with reflux esophagitis had HH compared to 2.5% of those without reflux esophagitis ($p < 0.01$). This emphasizes the close link between HH and GERD-related symptoms. Dysphagia (43.1% vs. 56.9%, $p = 0.011$) and nausea (46.2% vs. 53.8%, $p = 0.004$) were significantly associated with HH in our study, further corroborating its impact on upper gastrointestinal symptoms. Unlike studies by Teerakanok et al., where symptom severity and HH size were more closely linked, our findings suggest that even smaller hernias may produce significant symptoms in our population.¹³ The observed symptom associations, particularly heartburn and regurgitation, reaffirm the role of HH in GERD pathophysiology and suggest that patients with these symptoms may benefit from more thorough evaluation, including imaging or endoscopy.

The results of this study underscore the clinical importance of identifying HH in patients with GERD. The strong associations with BMI, symptom chronicity, and lifestyle factors highlight the need for a multifaceted approach to management. Lifestyle modifications, such as weight loss and smoking cessation, should be emphasized, particularly for overweight or sedentary individuals, to mitigate the risk of HH and improve GERD outcomes.^{21,22} Given the high prevalence of HH in patients with prolonged GERD symptoms, early endoscopic evaluation is warranted to identify anatomical contributors to refractory symptoms.²³ The significant association between HH and rural residence calls for targeted educational and diagnostic efforts in underserved populations.

This study had several limitations. As a retrospective observational study, it is subject to selection bias,

particularly as patients were referred for endoscopy based on symptomatic presentation. The use of endoscopy as the sole diagnostic tool may have missed smaller or transient hernias not visible during the procedure. The narrow age range (18–45 years) limits the generalizability of our findings to older populations where HH prevalence is typically higher. We did not assess hernia size, which may influence symptom severity and management decisions. Lastly, lifestyle factors such as dietary habits and stress levels, which are known to influence GERD and HH, were not evaluated.

CONCLUSION

This study highlights a high prevalence of HH among patients undergoing endoscopy for GERD, with significant associations with BMI, rural residence, symptom chronicity, smoking, and sedentary behavior. Future studies should explore the impact of hernia size, dietary factors, and stress on GERD outcomes, as well as the effectiveness of tailored lifestyle and surgical interventions in diverse populations. Addressing these gaps can contribute to improved management strategies for GERD and HH in both regional and global contexts.

Author's Contribution:

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Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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