Zagazig University Medical Journal
www.zumj.journals.ekb.eg
https://doi.org/10.21608/zumj.2025.351826.3786 Volume 31, Issue 3, March. 2025
Manuscript ID: ZUMJ-2501-3786
DOI: 10.21608/ZUMJ.2025.351826.3786
ORIGINAL ARTICLE

Evaluation of Different Types of Gastric Polyps Accidentally Discovered During Upper Gastrointestinal Endoscopy

Ahmed Lofty Sharaf[1*], Sherif M Galal[1], Mohamed Ibrahim Mohamed Ismail[1]
[1]Hepatology & Gastroenterology and Infectious Diseases Department, Faculty of Medicine, Zagazig University, Zagazig, Egypt.

[*]**Corresponding author:**
Ahmed Lofty Sharaf
Email:
drahmedsharaf77@gmail.com

Submit Date: 10-01-2025
Accept Date: 25-01-2025

ABSTRACT

Background: Gastric polyps are asymptomatic lesions incidentally discovered during upper gastrointestinal (GI) endoscopy. This study aimed to determine the prevalence of gastric polyps and to identify the different histological types of them found in upper GI endoscopic settings and their associated risk factors.
Methods: This study included 964 patients who underwent scheduled and emergency upper GI endoscopy. All patients underwent full history taking, clinical examination, laboratory investigations, and upper GI endoscopy. Biopsies were obtained from gastric polyps to detect histological types and from the gastric mucosa for Helicobacter pylori (H. pylori) testing.
Results: Forty patients (4.2%) were diagnosed with gastric polyps. 75% of cases were diagnosed with only one polyp, whereas 10 cases (25%) were diagnosed with two or more polyps. The gastric body was the most common polyp site (17 cases), followed by the antrum (13 cases). Approximately half of cases were of the hyperplastic type (57.5%), followed by the fundic type (30%), then adenomatous polyp and adenocarcinoma (5%), and finally the gastrointestinal stromal tumor (GIST) type (one case). There was a statistically significant relation between the presence of polyps and prolonged proton pump inhibitors (PPIs) intake ($p = 0.024$), while there was no statistically significant relation between the presence of polyps and H. pylori infection ($p > 0.05$).
Conclusions: The prevalence of gastric polyps was 4.2%. Hyperplastic polyps are the most common histological type of gastric polyps. Prolonged PPIs intake was the only risk factor that showed a statistically significant association with gastric polyps.
Keywords: Gastric polyps; Hyperplastic polyps; Fundic gland polyp; PPIs; H. Pylori.

INTRODUCTION

Gastric polyps are usually diagnosed accidentally during upper gastrointestinal (GI) endoscopy, and most are asymptomatic [1]. Gastric polyps may rarely be malignant or can be caused by different risk factors, particularly chronic gastritis, chronic Helicobacter pylori (H. pylori) infection, and chronic use of proton-pump inhibitors (PPIs) [2].

Gastric polyps are classified on basis of their histological features. Epithelial polyps are the most common and include hyperplastic and fundic gland polyps. Adenomatous polyps are less frequent, accounting for only 1% to 12% of cases. However, the frequency of gastric polyp subtypes varies greatly depending on the population characteristics [3].

Gastric polyps have the potential to become malignant depending on their histological type. The probability of malignant transformation is low for hyperplastic polyps (2%), but it can reach 30% in adenomatous polyps [4, 5]. Reported cases of hyperplastic polyps with malignant transformation are well-or moderately differentiated adenocarcinoma and extremely rare poorly differentiated adenocarcinoma [6].

Therefore, biopsies and histological examinations of gastric polyps are very important, as gross appearance and pathological results are not always the same. The presence of specific risk factors for different types of gastric polyps can be helpful in making appropriate clinical decisions [7].

Previous studies have shown a low prevalence of gastric polyps in various populations, but the increasing frequency of hyperplastic polyps and fundic gland polyps may be due to chronic use of PPIs or chronic H. pylori infection, which makes the evaluation of gastric polyps is important in our locality.

This study aimed to determine the prevalence of gastric polyps and identify the different histological types found in upper GI endoscopic settings and their associated risk factors in patients undergoing upper GI endoscopy in the endoscopy unit of the Hepatology & Gastroentrology and Infectious Diseases Department, Zagazig University.

METHODS

This cross-sectional study was conducted at the Endoscopy Unit of the Hepatology & Gastroentrology and Infectious Diseases Department, Zagazig University Hospitals. This study included 964 patients who underwent upper GI Endoscopy. All patients who underwent either scheduled or emergency upper gastrointestinal endoscopy for any reason within the predefined study timeline were included. However, patients with any contraindication for upper GI endoscopy were excluded, such as those with severe cardiopulmonary conditions, uncontrolled heart failure, recent pulmonary embolism, unstable hemodynamic status, uncontrolled hypertension, active systemic infection, or uncorrected bleeding disorders.

All patients were subjected to the following:

- Detailed history taking with specific information about conditions, such as previous colon or gastric polyps, hereditary polyposis syndromes, colorectal cancer, and liver cirrhosis, was documented. A history of drug use, especially prolonged use of PPIs, has also been reported. PPIs should be used for more than six months before enrollment in the study.
- Complete physical examination (general & local).
- Laboratory tests included complete blood count, liver function, kidney function, coagulation profile, and serology for viral hepatitis.
- Abdominal ultrasonography (Mindray DC-N2): Especially in patients suspected to have liver cirrhosis. Liver size, surface, and echogenicity were determined. In addition, the size of the spleen and the presence of ascites were evaluated.
- Upper GI endoscopy (Pentax EPN 3500) was performed on all patients, with specific attention paid to the indications for endoscopy, presence of gastric polyps (site, size, and number of them), and the presence of chronic gastritis or H. pylori infection.
- Biopsies were obtained from identified polyps for histological examination to determine the polyp type, as well as from the gastric mucosa for H. pylori testing.

Ethical consideration

Written informed consent was obtained from all the patients before enrollment in this study. The Institutional Ethical Committee at Zagazig University, Faculty of Medicine, approved the study (ZU-IRB #6288/10-8-2020).

STATISTICAL ANALYSIS

Data were statistically analyzed using SPSS Statistics for Windows (version 28.0). Independent t-tests were used for normally distributed continuous variables, whereas Mann-Whitney U tests were used for non-parametric data. Categorical variables were compared using the chi-square test or corrected Wald test statistic. The strength of association between categorical variables was assessed using odds ratios (OR) with 95% confidence intervals (CI). For multivariate analysis, logistic regression was performed to adjust for potential confounding factors, with results presented as adjusted ORs with corresponding 95% CIs. Univariate and multivariate logistic regression models were used to identify the independent risk factors. Statistical significance was set at $P < 0.05$.

RESULTS

Patient characteristics are represented in Table **(**1). The most frequent finding in upper GI endoscopy examinations was esophageal varices, which were found in 297 (30.8%), while gastric polyps were found in 40 (4.2%) cases (Table 2). Demographic and clinical data of patients with gastric polyps are presented in Table (3)**.** Liver cirrhosis was diagnosed in only 20% of cases. Notably, most patients were taking PPIs (87.5%) and 55% of them reported that they had H. pylori infection or received treatment for it. Regarding gastric polyp characteristics, gastric body polyps ranked first

(42%) followed by the antrum (32.5%) then fundus (25%). 75% of cases were diagnosed with only one polyp, whereas 10 cases (25%) were diagnosed with two or more polyps. The majority of polyps were smaller than 1 cm (72.5%) and 10% of them were larger than 2 cm. Histopathological examination revealed that approximately half of polyps were of the hyperplastic type (23 cases, 57.5%), followed by the fundic type (12 cases, 30%), then adenomatous polyps and adenocarcinomas (2 cases, 5% each), and finally, the GIST type (only one case, 2.5%). There was a significant relationship between the site of the gastric polyps and histopathology (P < .001). Fundic gland polyps were significantly associated with the fundus site (80%), whereas hyperplastic polyps were significantly associated with both the body and antrum (70.6%, and 76.9%, respectively). Adenomatous polyps, GIST, and adenocarcinomas showed no significant differences in their distribution across sites. There was a statistically significant relation between the presence of polyps and PPIs intake (p = 0.024), as 35 (5.2%) cases with polyps had a positive history of PPIs intake, whereas there was no statistically significant relation between the presence of polyps and H. pylori infection or cirrhosis (Table 4). Additionally, 1.7% of non-PPIs users had hyperplastic polyps and fundic gland polyps compared with 4.4% of PPIs users (Z = -2.2, p = 0.027), suggesting an increased occurrence of these polyps in PPIs users. No significant associations were observed for adenomatous polyps, adenocarcinomas, or GIST (p-values > 0.8, and P = 1, respectively) (Table 5).

Table (6) shows the univariate and multivariate analyses of the risk factors predicting the presence of polyps. A history of PPIs intake was significantly associated with, and can be used as a predictor for, polyps. Factors that were significant in the univariate analysis were adjusted for in the multivariate model. A history of PPIs intake can act as an independent predictor of polyps.

Table 1: Demographic and clinical data of included patients

Parameters		**Patients (N = 964) %**
Age (years) Mean ± SD		57.59± 6
Gender	**Male**	480 (49.8%)
	Female	484 (50.2%)
Cirrhosis		447 (46.4 %)
History of PPIs intake		677 (70.2 %)
History of H. pylori infection or treatment		572 (59.3 %)
Family history of previous polyps		16 (1.7%)
Family history of GIT malignancy		4 (0.4%)
Indication for endoscopy	**Follow up band ligation**	336 (34.9%)
	Vomiting	238 (24.7%)
	Epigastric pain	124 (12.8%)
	Anemia	143 (14.9%)
	Melena	32 (3.3%)
	Others (dysphagia, chest pain, anorexia, and hiccup)	91 (9.4%)

SD, standard deviation; PPIs, proton pump inhibitors; Helicobacter pylori, H. pylori.

Table 2: Upper GI endoscopy findings

Endoscopic findings	**(N = 964)**	
	N	**%**
Esophageal varices	297	30.8%
Normal study	155	16.1%
GERD	168	17.4%
Gastritis & ulcer	145	15%

Endoscopic findings	**(N = 964)**	
	N	**%**
PHG	147	15.3%
Polyps	40	4.2%
Hiatus hernia	10	1%
Malignant mass	2	0.2%

GERD, gastroesophageal reflux disease; PHG, portal hypertensive gastropathy.

Table 3: Demographic and clinical data among patients with gastric polyps

Parameter		**Patients with polyps (N = 40) %**
Age (Mean ± SD)		52.45 ± 8.17
Sex	**Male**	10 (25%)
	Female	30 (75%)
Liver cirrhosis		18 (45%)
History of PPIs intake		35 (87.5 %)
History of H. pylori infection or treatment		22 (55%)
History of previous polyps		6 (15%)
Family history of polyps		3 (7.5%)
Indications of endoscopy	**Abdominal pain**	15 (37.5%)
	Anemia	15 (37.5%)
	Dyspepsia	5 (12.5%)
	Dysphagia	2 (5%)
	Follow up band ligation	1 (2.5%)
	Vomiting	1 (2.5%)
	Melena	1 (2.5%)

SD, standard deviation; PPIs, proton pump inhibitors.

Table 4: Relation between presence of polyps and PPIs intake, H. pylori infection and cirrhosis

		Polyps				**P value†**
		Yes		**No**		
		No.	**%**	**No.**	**%**	
PPIs intake	**Yes**	35	5.2	5	1.7	0.024*
	No	642	94.8	282	98.3	
H. pylori infection	**Yes**	22	3.9	18	4.6	0.34
	No	550	96.1	374	95.4	
Cirrhosis	**Yes**	22	4.9	18	3.5	0.339
	No	425	95.1	499	96.5	

†Chi square test.

* P value <0.05 is considered statistically significant.

PPIs, proton pump inhibitors; Helicobacter pylori, H. pylori.

Table 5: Relation between histopathology of polyps and PPIs intake

	PPIs intake				p- value†
	No (n= 287)		Yes (n= 677)		
	No	%	No	%	
Hyperplastic polyps & fundic gland polyps	0	1.70	30	4.43	0.027*
Adenomatous polyps	0	0.00	2	0.30	0.8
Adenocarcinoma	0	0.00	2	0.30	0.8
GIST	0	0.00	1	0.15	1

†Corrected Wald test statistic.
*P value <0.05 is considered statistically significant.
PPIs, proton pump inhibitors.

Table 6: Univariate and multivariate analysis for risk factors predicting presence of polyps

Parameters	Univariate analysis				Multivariate analysis			
	dds ratio (OR)	95%CI		P-value	Odds ratio (OR)	95%CI		P-value
		Lower limit	Lower limit			Lower limit	Upper limit	
Age	1.45	0.136	15.497	0.759				
Gender (male)	0.692	0.216	2.218	0.535				
Cirrhosis	0.276	0.126	0.606	0.511				
Family history polyps	1.4	0.632	3.101	0.407				
Previous history of polyps	1.765	0.72	4.325	0.214				
History of PPIs intake	4.88	2.137	11.145	<0.001	5.221	1.77	15.5	0.003
H. pylori infection	0.674	0.358	1.27	0.222				

CI, Confidence interval; PPIs, proton pump inhibitors; Helicobacter pylori, H. pylori.

DISCUSSION

This cross-sectional study aimed to determine the prevalence of gastric polyps and identify the different histological types found in upper GI endoscopic settings and their associated risk factors in patients undergoing upper GI endoscopy in the Endoscopy Unit of the Hepatology & Gastroentrology and Infectious Diseases Department, Zagazig University Hospitals. To our knowledge, this is the first study to evaluate different types of gastric polyps in a large tertiary hospital in the Delta of Egypt, and it included a large number of patients undergoing upper GI endoscopy for different causes.

There is great variability in the frequency of different gastric polyps. Polyps' detection rate is 0.6% in Brazil and 6.35% in the United States [8, 1]. Fundic gland and hyperplastic polyps represent up to 60-90% of gastric polyps, followed by adenomatous polyps [8, 1, 9]. The common type is hyperplastic polyps, which represent 44-70% of gastric polyps in most studies [8, 10, 11], but in another study, fundic gland polyps represented 77%, with a higher prevalence than other published studies [1].

In our study, gastric polyps were detected in 40 patients (4.2%). This percentage agrees with El Hanafi et al., who reported approximately the same prevalence as our study (4.7%) [2]. In contrast, a large study conducted by Yacoub et al. reported gastric polyps' prevalence of only 0.46%, which was significantly lower than our reported prevalence [12]. This may be attributed to the larger study sample or different patient demographics. Differences in the prevalence of gastric polyps may be attributed to factors such as chronic PPIs intake or chronic H. pylori infection [2, 13-15].

In the present study, polyps were discovered accidentally during upper GI endoscopy, which was performed to evaluate GI complaints unrelated to the polyps themselves or in asymptomatic patients examined for other causes. The primary indications for endoscopy in all studied patients were follow-up after band ligation in approximately 336 patients (34.9%), vomiting in approximately 238 patients (24.7%), epigastric pain in approximately 124 patients (12.8%), and anemia in 143 patients (14.9%), with less common indications including melena and other symptoms such as dysphagia, chest pain, anorexia, and hiccups. These findings are similar to those reported in other publications [1, 11].

Gastric polyps may rarely cause upper GI bleeding, abdominal pain, and obstruction. Also, there is an association between anemia or upper GI bleeding and hyperplastic polyps, while dyspepsia and gastroesophageal reflux symptoms are related to fundic gland polyps [16, 17]. In our study, common complaints among patients with gastric polyps included abdominal pain and anemia, each reported by 37.5% (15 patients), while dyspepsia was noted in five patients (12.5%). This is in line with the histologic type of polyps, as hyperplastic polyps, being the most common type were, present in 57.5% (23 patients) and fundic gland polyps were found in 30% (12 patients). Anemia in these patients may be due to causes other than gastrointestinal tract issues, and most of those patients were female.

In the present study, 75% of cases had a single polyp, while 10 patients (25%) had two or more polyps. The most common site for these polyps was the body of the stomach (42.5%), followed by the antrum (32.5%) and the fundus (25%). In contrast, Caliskan and Kacmaz reported that the antrum was the most common site, followed by the fundus [18]. Most polyps in our study were less than 1 cm in diameter (72.5% of cases). Polyps measuring 1-2 cm were observed in 17.5% of patients, and those larger than 2 cm were observed in 10% of patients. In agreement with these results, a study done by Olmez et al. reported that most polyps were less than 1 cm in size [7].

We found that hyperplastic polyps, being the most common type, were present in 57.5% of cases, while fundic gland polyps were found in 30% of these cases. Adenomatous polyps and adenocarcinoma were each identified in 5% (2 patients), and GIST was detected in one patient (2.5%). Inconsistent with these results, Yacoub et al. reported that the hyperplastic polyps were the most common type [12]. Similarly, two Spanish studies have reported that hyperplastic polyps were the most common [9, 19]. In contrast, a large American study demonstrated that fundic gland polyps represent 77%, which is a higher prevalence than other published studies [1].

In patients with gastric polyps, it is important to test for H. pylori infection and take biopsies from the gastric mucosa to diagnose chronic gastritis if present [20, 21]. Our study did not detect any significant association between H. pylori infection and gastric polyps (P = 0.34). In contrast, a meta-analysis conducted by Ouyang et al. reported that the eradication of H. pylori significantly aided in gastric polyp elimination. In addition, they reported that successful eradication of H. pylori increased the gastric polyp elimination rate by more than 20 times that of the control group [22]. This may be due to large number of patients in our study had a history of H. pylori eradication therapy (59.3 %) before enrollment in the study and high percentage of patients with chronic PPIs use (70.2 %.).

Additionally, we found no statistically significant association between liver cirrhosis and development of gastric polyp (P = 0.339). Inconsistent to our results, Amarapurkar et al. demonstrated that the prevalence of portal hypertensive polyps was 3.2%, which is like the normal population [23]. Similarly, Lemmers et al. found a low prevalence of portal hypertension-associated polypoid lesions [24]. In contrast, Topal et al**.** reported a significant association between advanced liver cirrhosis and gastrointestinal polypoidal lesions (P < 0.001) [25].

In our study, there was a statistically significant relation between chronic PPIs intake and gastric polyps (both hyperplastic and fundic gland polyps together) (p = 0.024). These results align with previous research by Hsu and Wen-Hung et al., who reported that patients who were on PPIs had a significantly higher prevalence of gastric polyps than those who did not take PPIs (P <. 0.001) [26]. When applying univariate and multivariate analyses for risk factors predicting the presence of polyps, a history of chronic PPIs intake was significantly associated with it and can be used as a predictor for gastric polyp occurrence.

In our study, fundic gland polyps were diagnosed in 12 patients (30% of the gastric polyp cases). Chronic H. pylori infection decreases fundic gland polyp formation. The high prevalence of H. pylori infection in Egypt may explain the low incidence in our study. Additionally, fundic gland polyps are

usually attributed to chronic PPIs use, and short-term PPIs use does not increase the risk of these polyps. The use of PPIs for a period of less than 1 year may not develop fundic gland polyps [27, 28]. The percentage of fundic gland polyps in this study was lower than that of hyperplastic polyps, which may be because PPIs had been taken for a short time. In addition, these polyps are small and may be missed during upper GI endoscopic examinations.

However, this study included a large number of patients; it had some limitations; Many data were independent and retrospectively collected from patients. This was a single-center study, and different endoscopists and pathologists participated in the study, which is another limitation owing to interobserver variability.

CONCLUSIONS

The prevalence of gastric polyps is 4.2%, most of which are located in the gastric body. Hyperplastic polyps are the most common histological type of gastric polyps. Prolonged PPIs intake was the only risk factor that showed a statistically significant association with gastric polyps.

CONFLICT OF INTEREST: No conflict of interest.

FUNDING: None.

AUTHOR CONTRIBUTION: We declare that all listed authors have made substantial contributions to all the following three parts of the manuscript:

- research design, or acquisition, analysis, or interpretation of data.
- drafting the paper or revising it critically.
- approving the submitted version.

We also declare that no-one who qualifies for authorship has been excluded from the list of authors.

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Citation

Sharaf, A., Galal, S., Ismail, M. I., Awwaad, S. Evaluation of Different Types of Gastric Polyps Accidentally Discovered During Upper Gastrointestinal Endoscopy. *Zagazig University Medical Journal*, 2025; (1108-1115): -. doi: 10.21608/zumj.2025.351826.3786