

Frequency of Gastric Cancer in Patients with Solitary Proximal or Distal Gastric Ulcers Diagnosed by Esophagogastroduodenoscopy: A Cross-Sectional Study

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ABSTRACT

Background:

There is evidence of a direct relationship between peptic ulcer disease (PUD) and the risk of gastric cancer. This study determined the prevalence of gastric cancer in individuals with solitary proximal or distal gastric ulcers admitted to Shahid Rahimi Hospital in Khorramabad, Iran, from 2019 to 2021.

Materials and Methods:

In this cross-sectional study, 635 patients were included. Age group and sex as well as data related to the year of admission, pathological examination, and location of the ulcer, were recorded in a researcher-made checklist. Data were analyzed using the SPSS software version 22 at a significance level of 0.05.

Results:

Out of the 635 patients, 66.3% (421) were male, and 33.7% (214) were women. The mean age was 62.5 ± 17.7 years. Overall, 16.7% of patients with gastric ulcers were diagnosed with gastric cancer by pathological examination. The frequency of malignancy was highest in the 80 years and older age group. There was a considerable association between malignancy and age group ($P < 0.001$; $df = 4$; $\chi^2 = 27.24$). There was no significant association between malignancy and sex ($P = 0.144$). A significant relationship was observed between malignancy and ulcer location ($P < 0.001$). Proximal ulcers were malignant in 24.6% of the cases ($n = 74$), while distal ulcers were malignant in 9.6% ($n = 32$).

Conclusion:

Older patients, men, and patients with gastric ulcers are more likely to develop gastric cancer. Therefore, more effective strategies should be developed to prevent this fatal condition.

Keywords: Gastric cancer; Gastric adenocarcinoma; Peptic ulcer disease; H. pylori

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INTRODUCTION

Peptic Ulcer Disease (PUD) is a digestive tract disorder that is usually located in the stomach or proximal duodenum. It is identified by denuded mucosa with the lesion reaching the submucosa or muscularis propria (1, 2). The prevalence of PUD ranges from 6% to 15%. It has been estimated that this rate is significantly higher in Iran (about 34%) (3). Many risk factors, such as *Helicobacter pylori* infection, age, low educational level, low socioeconomic status, and non-steroidal anti-inflammatory drugs, have been attributed to PUD (4). Clinical manifestations are variable, including abdominal pain, nausea/vomiting, and weight loss. Peptic ulcers may also be complicated by bleeding or perforation (2).

Gastric cancer is among the most prevalent cancers causing significant mortality (5). In some Western Asian countries such as Iran, gastric cancer is the most frequent malignancy and the main cause of cancer-related death among men (6). Gastric cancer is a heterogeneous condition, and different environmental and genetic risk factors have been attributed to it (7). Gastric ulcers are one of the influential factors in the development of gastric cancer (8). Gastric ulcers and gastric cancer have common risk factors. The risk of malignant gastric tumors is twice the expected rate in those diagnosed with gastric ulcers, while there is a 40% decrease in risk in individuals with duodenal ulcers (9). A majority of gastric cancers are adenocarcinomas, with significant heterogeneity among patients (10). Image-enhanced endoscopy accompanied by biopsy sampling for histopathological evaluation is the ideal approach for detecting gastric cancer (11).

Several epidemiological studies have found that the incidence of distal gastric cancer has steadily diminished, whereas there has been a clear increase in the incidence of proximal gastric cancer in recent years. As proximal gastric cancer might differ from distal gastric malignancy in terms of clinicopathological features, it seems crucial to determine their trends in different populations (12, 13). Considering the reported increase in the incidence of proximal gastric cancer and the high prevalence of PUD among the Iranian population, this study was conducted to investigate the prevalence of gastric cancer in individuals with solitary proximal or distal gastric ulcers admitted to the Shahid Rahimi Hospital in Khorramabad, Iran, from

2019 to 2021. Since the clinicopathological features of proximal and distal gastric cancers might be different, determining their trends in our population can aid in the prevention and management of gastric malignancy.

MATERIALS AND METHODS

Study design and participants

This was a cross-sectional study implemented in the Department of Gastroenterology and Hepatology, Shahid Rahimi Hospital, Khorramabad, Iran, from 2019 to 2021. The inclusion criteria were all patients ≥ 18 years old referred for esophagogastroduodenoscopy and diagnosed with proximal or distal gastric ulcers. The patients were excluded if their medical records were incomplete. The census sampling method was used during a 3-year period. Based on a pilot study of 50 patients with gastric ulcers and using the following formula, when $z_{1-\frac{\alpha}{2}} = 1.96$ ($\alpha=0.05$), $P=0.112$, $d=0.03$, the minimum sample size required was estimated to be 423 patients.

$$n = \frac{\left(z_{1-\frac{\alpha}{2}}\right)^2 p(1-p)}{d^2} = \frac{1.96^2 \times 0.112 \times 0.888}{(0.03)^2} \cong 423$$

Considering an effect size of 1.5, a sample size of 635 individuals was calculated. After reading the esophagogastroduodenoscopy reports of 6400 patients, 635 patients with a diagnosis of solitary proximal or distal gastric ulcers were included.

Data collection

After obtaining written consent, demographic information, including age group and sex, and data related to the year of referral, pathological examination, and location of the ulcer were recorded in a researcher-made checklist.

Data analysis

The collected data were analyzed using IBM SPSS software, version 22.0. Armonk, NY. Qualitative statistical tools such as frequency distribution tables were utilized for data description. Fisher's exact test and Chi-square test were used for analysis. The significance level was set at 0.05 for all tests.

Ethical considerations

This study was conducted with the permission of the Research Ethics Committee of Lorestan University of Medical Sciences (ethical code IR.LUMS.REC.1401.023). Written and informed consent was obtained from all subjects. The checklists were designed anonymously, and participants' personal information remained confidential. This study was conducted in accordance with the principles of the Declaration of Helsinki.

RESULTS

Out of the 635 patients, 66.3% (421) were male, and 33.7% (214) were female. The mean age was 62.5 ± 17.7 years, with a minimum age of 18 and a maximum age of 95 years. The age group of 60 to 79 years had the highest frequency (251 people-39.5%). A total of 334 patients (52.6%) had ulcers in the distal region. 250 patients (39.4%) had been referred in the year 2019. Further details are provided in Table 1.

A total of 106 patients (16.7%) had been diagnosed with gastric cancer by pathological examination. There was a statistically significant relationship between malignancy and the patients' age group ($P < 0.001$; $df = 4$; $\chi^2 = 27.24$). However, no significant association was found between malignancy and sex ($P = 0.144$). A marked relationship was discovered between malignancy and the location of ulcers ($P < 0.001$). Also, we found no noticeable link between malignancy and the year of referral ($P = 0.172$;

Table 1. Frequency distribution of the patients with gastric ulcers by demographic and underlying variables

Characteristic	Frequency	Percentage (%)	
Age group	<20	8	1.3
	20-39	70	11.0
	40-59	176	27.7
	60-79	251	39.5
	80<	130	20.5
Sex	Male	421	66.3
	Female	214	33.7
Location of ulcer	Proximal	301	47.4
	Distal	334	52.6
Year of referral	2019	250	39.4
	2020	230	36.2
	2021	155	24.4

$df = 2$; $\chi^2 = 3.516$). Further details are provided in Table 2.

DISCUSSION

This study aimed to determine the prevalence of gastric cancer in individuals with solitary proximal or distal gastric ulcers admitted to Shahid Rahimi Hospital in Khorramabad, Iran, from 2019 to 2021. In total, 635 patients diagnosed with solitary proximal or distal gastric ulcers were included. In the present study, 16.7% of patients with gastric ulcers were diagnosed with gastric cancer by pathological examination. In a previous study, a history of gastric ulcers caused an odds ratio of 1.53 for gastric cancer (14). In another study, gastric cancer occurred in 30 of 1,222 patients with PUD who received *H. pylori* eradication therapy (15). In this study, 74 of 106 cases of gastric cancer were localized in proximal areas. Furthermore, malignancy was considerably related to the location of ulcers. Proximal ulcers were malignant in 24.6% of the cases, while distal ulcers were malignant in 9.6%. Contrary to the present study, Yu et al. in a study on 964 patients with gastric cancer, reported a frequency of 80.6% for distal gastric cancer. They also observed a higher survival rate in patients with distal gastric cancer than in those with proximal gastric cancer (16). Moreover, Zhao et al. reported that 59.8% of patients with gastric cancer had distal forms, and patients with proximal forms were more likely to be older and male (17). On the other hand, it has been observed that although the incidence of gastric cancer is decreasing, there has been an increasing trend for proximal gastric cancer, and this trend is estimated to continue in the following decades (18). There are differences between distal cancer and proximal gastric cancer in terms of frequency and clinicopathological features (17). In comparison to distal gastric cancer, proximal gastric cancer shows diverse histology and is accompanied by overexpressed HER2 and Sirt1 genes. Proximal gastric cancer is substantially smaller than distal gastric cancer, penetrates more deeply, and exhibits less lymph node invasion. Proximal gastric cancer tends to show a worse overall 5-year survival rate (19).

We also evaluated the association between demographic characteristics and gastric cancer. The mean age of the subjects was 62.5 ± 17.7 years, which was in line with the results of previous studies (20, 21). The risk for PUD

Table 2. Relationship between gastric adenocarcinoma in patients with solitary proximal or distal gastric ulcers and demographic and underlying variables

Characteristic	Gastric adenocarcinoma				P value	
	Yes		No			
	Frequency	%	Frequency	%		
Age group (years)	<20	0	0.0	8	100.0	<0.001*
	20-39	1	1.4	69	98.6	
	40-59	19	10.8	157	89.2	
	60-79	56	22.3	195	77.7	
	80<	30	23.1	100	76.9	
Sex	Male	77	18.3	344	81.7	0.144**
	Female	29	13.6	185	86.4	
Location of ulcer	Proximal	74	24.6	227	75.4	<0.001**
	Distal	32	9.6	302	90.4	
Year of referral	2019	46	18.4	204	81.6	0.172*
	2020	30	13.0	200	87.0	
	2021	30	19.4	125	80.6	

* Monte Carlo simulation for chi-square test; ** Fisher's exact test

increases with age. Individuals aged 25–64 years are at the highest risk of developing PUD (22). Furthermore, age>60 years is a known risk factor for morbidity and mortality following PUD complications (23). A statistically significant relationship was observed between malignancy and patient age. Similar to most cancers, the risk of gastric cancer increases with age. In the U.S., it is most commonly observed among individuals aged 65–74 years (24). In a large cohort study, the average age at gastric cancer diagnosis was 70 years (9). Age is also an important factor in determining the prognosis of patients with gastric cancer. In older patients, the prognosis of gastric cancer is usually poorer than that in younger individuals (25). Men were predominant in this study; however, there was no statistically significant relationship between malignancy and sex. Inconsistent with our findings, it has been reported that men have a 2- to 3-fold higher incidence rate of gastric cancer than women (6, 26).

LIMITATIONS

The limitation of this study is the use of data from a single center; however, different demographic factors were analyzed to aid in the understanding of the epidemiology of gastric cancer in patients with gastric ulcers.

CONCLUSION

Some groups, such as the elderly, men, and patients with gastric ulcers, are more likely to develop gastric cancer. Therefore, more effective strategies should be developed to prevent this fatal condition.

COMPETING INTERESTS

The authors declare no conflict of interest related to this work.

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