

## A Retrospective Study to Find Correlation Between Clinical and Pathological Factors of Gastric Cancer

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## Abstract

### Introduction

We looked at age, sex, haemoglobin, operation methods, operation time, and amount of transfusion during operation, postoperative hospital stay, postoperative complications, positive proximal margin, tumour location, tumour size, differentiation, depth of tumour invasion, lymph nodes, and lymphatic metastasis rate.

The frequency of positive lymph nodes is equal to the number of metastatic lymph nodes divided by the total number of lymph nodes removed.

The purpose of this research was to discover a link between clinical and pathological characteristics in stomach cancer in Odisha, India. Methods: A one-year retrospective research was conducted at the Department of General Surgery, SCB Medical college and hospital, cuttack.

### Results:

Of the 80 patients, 50 (62.5%) were male and 30 (37.5%) were female; 50 (62.5%) had distal gastrectomy, 5 (6.25%) had proximal gastrectomy through belly and 15 (18.75%) had proximal gastrectomy via thorax, and 10 (12.5%) had complete gastrectomy. Distal and complete gastrectomy exhibited greater lymph node clearances than the other operating techniques. Postoperative problems occurred in 8 patients (10%), including stomach retention (20%), anastomotic leakage (10.5%), incision infection (9.25%), wound disruption (5.25%), and thoracic cavity effusion (5.25%). The complication was more prevalent in individuals undergoing proximal gastrectomy through abdomen (30%). Overall, the mortality rate was 1.25% (1/80). The diameter of the neoplasm was linked to the depth of infiltration and the

rate of lymphatic metastasis, although haemoglobin was not. 12 (15%) of the 80 patients had early gastric cancer (EGC) with lymph node metastases. These patients had 4%-5% fewer positive lymph nodes than advanced gastric cancer patients (Table 2). In a linear regression analysis, the tumor's age and diameter were adversely linked with preoperative haemoglobin (P0.001). The tumor's diameter associated positively with age and the number of positive lymph nodes (P0.01). Patients with poorly differentiated tumours were younger than those in the other categories, who had greater tumour diameters and a higher incidence of positive lymph nodes. The depth of tumour invasion on the stomach wall was unrelated to the degree of differentiation. The tumour diameter on the corpus and fundus was greater than those on the corpus and fundus, which had a higher incidence of positive lymph nodes. Females were more likely than males to have proximal gastric cancer, poor differentiation, and a frequency of >36% positive lymph nodes. **Conclusion:** This retrospective investigation found that clinic-pathological characteristics of gastric cancer differed by gender, location, and tumour diameter.

### Introduction

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Gastric cancer is a complex, diverse illness that is the fifth most prevalent cancer and the third major cause of cancer-related mortality globally in 2018[1,2]. Increased knowledge of proliferative and apoptotic changes in gastric cancer, including the development of new biomarkers for cancer detection and therapy targets, may lead to advancements in diagnosis, treatment, and prevention. According to prior studies, 0.7 million individuals died from stomach cancer each year [3], with around 70% of cases having a high mortality rate, much higher than other malignancies such as liver and breast cancers [4]. However, the incidence and death rates of gastric cancer fluctuate widely, with significant differences between Western and Eastern countries [3]. Although several risk variables were discovered in the research, the demographic and clinic-pathological aspects of stomach cancer remain mainly unknown. It has been documented that survival rates are poorer among smokers, alcoholic drinkers, obese persons, and those who have esophageal acid reflux symptoms and eat pickled, salty, and smoked foods [5-6]. According to studies, the incidence rate of stomach cancer is closely connected with age, particularly among patients aged 50 to 70 years old [7-8]. According to reports, gastric carcinoma is one of the leading causes of cancer-related costs; nonetheless, the absolute number of patients and prognosis remain major difficulties in health-care programs [9].

Surgery coupled with chemotherapy is now the most common treatment for stomach cancer. The most popular therapy for gastric cancer is surgery, although the survival percentage of individuals who have surgery remains relatively poor. Previous research has shown that patients with advanced stomach cancer had an average survival span of 12 months [10,11]. As a result, how to evaluate the situation in real time, calculate the prognosis risk after therapy, and establish a suitable postoperative care plan has become an essential aspect of gastric cancer treatment

[12,13]. Many clinicopathological markers, including as clinical stage, tumour size, infiltration depth, Lauren classification, and lymph node metastatic rate, may all have an impact on the prognosis of patients with gastric carcinoma [14,15]. Because numerous variables are closely interrelated, it is vital yet difficult to determine the most relevant and independent elements associated with prognosis. The present research was carried out in order to get a thorough understanding of gastric carcinoma and to discover independent risk variables in gastric cancer patients.

### **Material and methods**

This one-year retrospective research was conducted at the Department of Pathology at Jawaharlal Nehru Medical College and Hospital in Bhagalpur, Bihar, India, with the consent of the protocol review committee and the institutional ethics committee. This research comprised a total of 80 patients.

We looked at age, sex, haemoglobin, operation methods, operation time, and amount of transfusion during operation, postoperative hospital stay, postoperative complications, positive proximal margin, tumour location, tumour size, differentiation, depth of tumour invasion, lymph nodes, and lymphatic metastasis rate.

The frequency of positive lymph nodes is equal to the number of metastatic lymph nodes divided by the total number of lymph nodes removed.

### **Results**

Of the 80 patients, 50 (62.5%) were male and 30 (37.5%) were female; 50 (62.5%) had distal gastrectomy, 5 (6.25%) had proximal gastrectomy through belly and 15 (18.75%) had proximal gastrectomy via thorax, and 10 (12.5%) had complete gastrectomy. Distal and complete gastrectomy exhibited greater lymph node clearances than the other operating techniques. Postoperative problems occurred in 8 patients (10%), including stomach retention (20%), anastomotic leakage (10.5%), incision infection (9.25%), wound disruption (5.25%), and thoracic cavity effusion (5.25%). The complication was particularly prevalent in individuals undergoing proximal gastrectomy through abdomen (30% of patients) (Table 1). Overall, the mortality rate was 1.25% (1/80).

The diameter of the neoplasm was linked to the depth of infiltration and the rate of lymphatic metastasis, although haemoglobin was not. 12 (15%) of the 80 patients had early gastric cancer (EGC) with lymph node metastases. These patients had 4%-5% fewer positive lymph nodes than advanced gastric cancer patients (Table 2). In a linear regression analysis, the tumor's age and diameter were adversely linked with preoperative haemoglobin (P0.001). The tumor's diameter associated positively with age and the number of positive lymph nodes (P0.01).

Patients with poorly differentiated tumours were younger than those in the other categories, who had greater tumour diameters and a higher incidence of positive lymph nodes. The depth of tumour invasion on the stomach wall was not associated to the degree of differentiation (Table 3). The tumour diameters on the corpus and fundus were greater than those on the corpus and fundus, which had a higher incidence of positive lymph nodes (Table 4). Females were more likely than males to have proximal gastric cancer, poor differentiation, and a frequency of >36% positive lymph nodes (Table 5).

Multiple analyses revealed that sex, tumour location, tumour diameter, depth of tumour invasion, and differentiation all play critical roles in lymph node metastasis (Table 6).

**Table 1: Comparison of operation manner with numbers of lymph nodes, time for operation, amount of blood transfusion during operation, hospitalization days and complications ( $x \pm s$ )**

Manners of operation	N (80)	Numbers lymph nodes	Time for operation (hours)	Amount of blood transfusion (mL)	Hospitalization stays (days)	Complications (%)
Distal gastrectomy	50	11.1±0.2*	3.7±0.04	402.65±14.77*	15.8±0.54	8.5
Proximal gastrectomy via abdomen	5	8.2 ±0.52	4.32±0.1*	609.36±40.39*	17.8±1.5	14*
Proximal gastrectomy via thorax	15	8.5±0.6	3.35±0.01	749.21±17.98	14.8±0.6	1.7
Total gastrectomy	10	13.2±0.2*	4.55±0.3*	747.03±44.69	19.1±1.3	12.1
P		<0.0001	<0.0001	<0.0001	>0.05	<0.001

\*Compared with other operative approaches

**Table 2: Comparison of depth of infiltration with age, diameter, hemoglobin, and lymphatic metastasis rate ( $x \pm s$ )**

Depth of invasion	N (80)	Age (yrs)	Diameter (cm)	Hemoglobin (g/L)	Lymphatic metastasis rate (%)
pT1(m)	14	52.1 ±1.7	2.38 ± 0.3	12.33 ± 0.5	3.17 ± 0.5
pT1(ms)	7	56.2±1.3*	2.58 ± 0.6	11.77± 0.4*	4.27 ± 1.0
pT2	8	56.9±1.4*	2.96 ± 0.5	11.87 ± 0.3*	8.73 ± 1.3*
pT3	9	57.6±1.3*	4.32 ± 0.4*	11.85 ± 0.3*	18.31 ± 2.5*
pT4	42	58.5±0.2*	5.42 ± 0.2*	11.64 ± 0.3*	34.52 ± 1.4*
P		<0.003	<0.0001	<0.001	<0.0001

Compared with pT1 (m).

**Table 3: Comparison of differentiation with age, diameter, hemoglobin and lymphatic metastasis rate ( $x \pm s$ )**

Differentiation	N (80)	Age (yrs)	Diameter (cm)	Hemoglobin (g/L)	Lymphatic metastasis rate (%)
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I	7	60.9±1.3	3.43±0.4	10.7±0.5	10.4±3.2*
II	10	59.9±0.5	3.97±0.5	11.6±0.3	24.2±2.2
III	26	60.1±0.3	4.20±0.2	11.3±0.5	20.9±1.5
IV	37	54.1±0.3*	4.82±0.1*	11.6±0.1*	30.9±1.3*
<i>P</i>		< 0.0001	= 0.002	= 0.01	< 0.0001

\*Compared with other groups

**Table 5: Comparison of sex with tumor location, differentiation, depth of invasion and positive lymph node rate (x± s)**

Gender	Location (%)			Differentiation (%)			Depth of invasion (%)			Frequency of metastatic lymph node (%)	
	Proximal	Middle	Distal	Well	Middle	bad	pT1	pT2	pT3	<35	>35
Male =50	4	3	3	2	3	4	2	4	10	8	7
Female =30	2	1	2	3	2	6	2	1	5	4	2
		<0.001	<0.001					>0.05	=0.01	<0.001	

**Table 6: Multi-factors analysis of lymphatic metastasis in gastric patients**

Related factors	Regression coefficient	Standard error	Standard regression coefficient	<i>P</i>
Constant	-22.4	7.5		0.001
Age	-0.0081	0.085	-0.27	0.412
Sex	-6.642	2.051	-0.077	0.001
Tumor location	2.425	0.692	0.074	0.003
Diameter of tumor	2.465	0.528	0.152	0.0001
Depth of invasion	7.231	0.775	0.279	0.0001
Differentiation	3.695	1.136	0.087	0.001

**Discussion**

Gastric cancer is still one of the leading causes of mortality. Although the aetiology of stomach cancer is unknown, studies have revealed that numerous variables relate to its growth, metastasis, and recurrence following surgery [16-18]. Recent research suggests that *Helicobacter pylori* infection may play an essential role in the development of stomach cancer [19,20]. *Helicobacter pylori* infection has been linked to acute and chronic gastritis, intestinal metaplasia, dysplasia, and finally gastric cancer.

Some aberrant gene expression [21,22] is implicated in gastric cancer carcinogenesis, such as the matrix metalloproteinases gene, the p53 gene, and the dinucleotide repeat sequence gene.

Abnormal trace element levels may potentially be a risk factor for gastric cancer [23,24]. Because of infrequent metastases in lymph nodes, early gastric cancer (EGC) has been deemed a kind of gastric malignancy with a comparatively excellent long-term prognosis compared to advanced gastric cancer [25,26]. In Japan, EGC is detected in 30%-50% of cases, owing in part to the widespread use of endoscopy and mass screening programs [27,28]. The percentage of EGC identified in all patients in this research is 65 (16.25%), which is comparable to the rate in the United States and Europe [29,30]. Endoscopic therapy has grown in popularity as an alternative to surgical treatment for individuals with EGA with the expectation of improving quality of life (QOL)[31]. However, because of the existence of metastases in 10%-20% of cases and the absence of lymph node metastasis, the justification for a conventional resection with systematic lymphadenectomy remains debatable [32].

Different surgical methods were used depending on the location of the tumour. In our research, complete gastrectomy had the most lymph nodes removed, followed by distal gastrectomy, which may be connected to removal of all or most of the omentum. The number of lymph nodes removed after proximal gastrectomy by trans abdominal was comparable to that of transthorax. In proximal gastrectomy by trans thorax, there was a shorter operating time and a reduced incidence of complications, whereas in proximal gastrectomy via trans abdomen, there was a lower blood transfusion. Their postoperative hospitalisation stays and positive resection margins were the same. Complications differed depending on the operation: stomach retention was prevalent in distal gastrectomy, but thoracic effusion and lung infection were more common in whole gastrectomy.

Although the overall incidence of gastric cancer in the Western world has remained steady, there is a well-documented shift from distal to proximal lesion. The clinical significance of this change is that individuals with proximal gastric cancer have a poorer overall prognosis than those with distal tumour. This disparity in survival might be ascribed to several variables, including higher biologic aggressiveness of proximal tumours and advanced stage of presentation [33,34]. A greater frequency of positive lymph nodes was discovered in gastric cancer situated on the corpus and the fundus in the research, which might be related to the bigger diameter of the tumour in the corpus and the fundus. Larger tumours had poorer differentiation, deeper infiltration, and a greater incidence of positive lymph nodes. The prognosis seems to be worse in these people. The current findings also reveal that females had more proximal lesions, poor differentiation, and a greater >35% frequency of positive lymph nodes than males. The number of metastatic lymph nodes affects the long-term prognosis following curative resection [35,36]. As a result, prolonged lymphadenectomy is recommended in advanced stomach cancer [37]. Our multivariate analysis revealed that the depth of invasion was the most significant factor determining lymph node metastasis among six clinicopathologic factors (age, sex, tumour site, tumour diameter, depth of invasion, and differentiation).

### **Conclusion**

This retrospective investigation found that clinic-pathological characteristics of stomach cancer differed by gender, location, and tumour diameter. The depth of invasion is particularly essential in lymph node metastasis. Females with stomach cancer may have a poorer prognosis than men. Because lymph node metastases may develop in individuals with EGC, radical gastrectomy with lymphadenectomy may be required in all stages of gastric cancer.

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