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AGE-RELATED VARIATIONS IN CLINICOPATHOLOGICAL FEATURES OF GASTRIC CANCER: A RETROSPECTIVE ANALYSIS FROM A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Globally, gastric cancer is the third leading cause of cancer-related deaths, with late-stage diagnosis and minimal screening making it challenging to manage in Pakistan.

Objective: The aim of this study is to investigate the association between age and clinicopathological features of Gastric cancer patients in a tertiary care hospital so as to serve as a guide towards early diagnosis

Methodology: A retrospective analysis of 123 gastric cancer patients treated at Khairpur Medical college teaching Hospital, Khairpur Mir's,from April 2021 to April 2024 was conducted. The study included age, gender, symptoms, tumor characteristics, and histological findings. Variables were evaluated using SPSS version 22, and the chi square test was used to assess the relationship between age groups and categorical factors such as tumor size, tumor site, grade, T stage, N stage, and M stage.

Results: The majority of patients were aged 40-60 years (47.15%), with a male predominance (65.04%). Common symptoms included abdominal discomfort (70%) and weight loss (58%). Tumors were predominantly located in the antrum (35.77%), with 74.80% smaller than 5 cm. poorly differentiated tumors were observed in 43.09% of cases. Tumor size and grade varied significantly with age; smaller tumors (<5 cm) were more common in the 40-60 age group ($p = 0.032$), while older patients (>60 years) often had well-differentiated tumors ($p = 0.010$). Advanced stages (T3, N2, and M1) were more prevalent in older individuals ($p < 0.05$).

Conclusion: Age significantly affects gastric cancer clinicopathological features, with older patients showing advanced stages and well-differentiated tumors, highlighting the need for early detection

Keywords: Gastric Cancer, Clinicopathological Features, Retrospective Analysis, Age, Tumor Characteristics

INTRODUCTION

Gastric cancer (GC) is the fifth most prevalent cancer and the third largest cause of cancer-related deaths globally [1]. Despite advancements in medical science and technology, its prognosis remains poor, primarily due to late-stage diagnosis in most cases [2].

As reported by the Global Cancer Statistics 2020, over one million new cases of gastric cancer and approximately 769,000 death were estimated accounting for 7.7% of all deaths occurred from cancer worldwide[3]. Gastric cancer cases are not equally distributed, over half of the cases and deaths around the world occurs in East Asia where gastric cancer is a definitely challenge to public health [3]. In Pakistan, the rise in occurrence is attributable to late diagnosis, and inadequate medical facilities leading to poor outcomes. The lack of extensive screening programs adds to the burden of this cancer[4].

The development of GC is multifactorial and results in the combination between environmental, dietary, genetic and infectious causes. In terms of life style, Helicobacter pylori infection as a main risk factor and high food intake, smoking, alcohol consumption are increasing the risk of gastric cancer [5].

Gastric cancer (GC) primarily develops in two regions of the stomach: the non-cardia and cardia areas. Non-cardia gastric cancer occurs in the lower stomach or the part of stomach that is involved in digestion and known as the antrum. The stomach is an organ that lies between the esophagus and small intestine and serves as a site of digestion by secreting not only gastric acid and enzymes but also intrinsic factors required for the absorption of vitamin B12. Inflammation of the stomach's inner lining, composed of glands and columnar epithelial cells, can lead to conditions such as peptic ulcers, gastritis, and ultimately, stomach cancer[6]. At the other end of the spectrum is cardia gastric cancer, which grows in the cardia area — at the top of the stomach where it meets to esophagus or food pipe. It is so named because it is nearest to the heart The term “cardia” is derived from its location near the heart [7].

The clinicopathologic characteristics of stomach cancer are important for personalizing treatment options and improving outcomes[8]. These characteristics, such as tumor size, histological subtype, lymph node involvement, and the existence of metastasis, are critical in evaluating the prognosis and directing therapy decisions[9].

Therefore, the study aim to investigate the association between age and the clinicopathological features of gastric cancer patients admitted in tertiary care hospital for better understanding of early diagnosis and effective management.

MATERIAL AND METHODS

This study presents a retrospective analysis of the clinicopathologic features of gastric cancer patients treated at Khairpur Medical College Teaching Hospital, Khairpur Mir’s, a renowned tertiary care center specializing in oncology and gastroenterology. The hospital's advanced diagnostic and therapeutic facilities provided a comprehensive dataset for evaluating the disease's characteristics and outcomes.

The study population included patients diagnosed with gastric cancer between April 2021 and April 2024, who underwent surgical resection or endoscopic biopsy and whose medical records were complete, including histopathological reports. Excluded from the study were patients with non-gastric malignancies, those who received only palliative care without diagnostic or therapeutic interventions, and individuals with incomplete or insufficient data.

The final sample consisted of 123 patients, selected based on the availability of eligible cases during the study period.

Data was collected from electronic and paper-based medical records, including histopathological reports and imaging studies. Collected variables included demographic information (age, gender, and ethnicity), clinical features (symptoms at presentation), and histopathological characteristics such as tumor location, tumor size, tumor stage (using the TNM classification system), and grade of differentiation (well, moderately, poorly differentiated).

In this study utilizing pre-existing medical records, a waiver of informed consent was granted, given that the research posed minimal risk to participants and the data was anonymized. Patient confidentiality was strictly maintained by anonymizing data and securing electronic records to prevent unauthorized access.

SPSS version 22 was used, descriptive statistics were employed to analyze the data, with percentages and frequencies serving as the outputs.

RESULTS

A total of 123 gastric cancer patients were included in this study. The majority of patients were between the ages of 40-60 years (47.15%), followed by patients older than 60 years (36.59%), while only 16.26% were under 40 years of age. The male-to-female ratio was 65.04% to 34.96%. Among comorbidities, hypertension was the most common, affecting 40.65% of the patients, followed by diabetes mellitus in 28.46%, and chronic liver disease in 9.76%. A family history of gastric cancer was present in 12.20% of the patients as mentioned in **Table 1.**

Table 1: Demographic Characteristics of Gastric Cancer Patients

Demographic Feature	Number of Patients	Percentage (%)
Total Patients	123	100.0
Age (years)		
< 40	20	16.26
40-60	58	47.15
> 60	45	36.59
Gender		
Male	80	65.04
Female	43	34.96
Comorbidities		
Hypertension	50	40.65
Diabetes Mellitus	35	28.46
Chronic Liver Disease	12	9.76
Family History of Gastric Cancer		
Yes	15	12.20
No	108	87.80

Total no of patients: n= 23

Data is presented as frequency and percentages

The frequency of symptoms experienced by the patients is shown in **Table 2**. Abdominal discomfort or epigastric pain was the most common symptom, reported by 70% of patients, followed by weight loss (58%), nausea and vomiting (32%), and early satiety or poor appetite (30%). Less frequent symptoms included dysphagia (21%), melena (17%), and heartburn (14%).

Table 2: Frequency of Symptoms in Gastric Cancer Patients (n = 123)

Symptoms	n (%)
Abdominal Discomfort / Epigastric pain	86 (70%)
Weight Loss	71 (58%)
Nausea and Vomiting	39 (32%)
Early Satiety and Poor Appetite	37 (30%)
Dysphagia	26 (21%)
Melaena	21 (17%)
Heartburn	17 (14%)

Data is presented as the frequency and percentage of patients reporting each symptom. Total number of patients: n = 123.

Regarding clinico-pathological features as shown in **Table 3**, 74.80% of patients had tumors smaller than 5 cm, while 25.20% had tumors larger than 5 cm. The most common tumor sites were the pylorus (29.27%) and antrum (25.20%), followed by the body (24.39%) and cardia (21.14%). Poorly differentiated tumors were observed in 43.09% of patients, while 36.59% had moderately differentiated and 20.33% had well-differentiated tumors. Most patients presented with advanced T stages, with T3 being the most common (48.78%), followed by T2 (22.76%), T4 (16.26%), and T1 (12.20%). In terms of nodal involvement, 32.52% had no nodal metastasis (N0), while 24.39%, 28.46%, and 14.63% had N1, N2, and N3 stages, respectively. Metastasis was observed in 34.96% of patients (M1), while 65.04% were metastasis-free (M0).

Table 3: Clinico-Pathological Features of Gastric Cancer Patients

Pathological Feature	Number of Cases	Percentage (%)
Tumor Size		
< 5 cm	92	74.80
> 5 cm	31	25.20
Tumor Site		
Cardia	26	21.14
Body	22	17.89
Antrum	44	35.77
Pylorus	31	25.20
Grade		
Well Differentiated	25	20.33
Moderately Differentiated	45	36.59
Poorly Differentiated	53	43.09
T Stage		
T1	15	12.20
T2	28	22.76
T3	60	48.78
T4	20	16.26
N Stage		
N0	40	32.52
N1	30	24.39
N2	35	28.46
N3	18	14.63
M Stage		
M0	80	65.04
M1	43	34.96

Data is presented as the number of cases and percentage of patients for each pathological feature. Total number of cases: n = 123.

Table 4 shows that tumor size varied significantly, with 48.9% of individuals aged 40-60 having tumors smaller than 5 cm ($p = 0.032$). The antrum was a common tumor location across all age categories, particularly in the 40-60 age group (45.5%). Tumor grade also varied, with well-differentiated tumors most common in individuals over 60 (64.0%) and poorly differentiated tumors more common in the 40-60 age group (52.8%) ($p = 0.010$). TNM stages varied by age, with advanced stages (T3, N2, M1) being more common in older individuals ($p < 0.05$).

Table 4: Association of Pathological Features with Age Groups in Gastric Cancer Patients

Pathological Feature	Age Group < 40 (%)	Age Group 40-60 (%)	Age Group > 60 (%)	p-value
Tumor Size				
< 5 cm	20 (21.7%)	45 (48.9%)	27 (29.3%)	0.032
> 5 cm	5 (16.1%)	13 (41.9%)	13 (41.9%)	
Tumor Site				
Cardia	10 (38.5%)	7 (26.9%)	9 (34.6%)	0.045
Body	4 (18.2%)	12 (54.5%)	6 (27.3%)	
Antrum	8 (18.2%)	20 (45.5%)	16 (36.4%)	
Pylorus	4 (12.9%)	16 (51.6%)	11 (35.5%)	
Grade				
Well Differentiated	2 (8.0%)	7 (28.0%)	16 (64.0%)	0.010
Moderately Differentiated	10 (22.2%)	20 (44.4%)	15 (33.3%)	
Poorly Differentiated	13 (24.5%)	28 (52.8%)	12 (22.6%)	
T Stage				
T1	3 (20.0%)	8 (53.3%)	4 (26.7%)	0.023
T2	4 (14.3%)	15 (53.6%)	9 (32.1%)	
T3	15 (25.0%)	20 (33.3%)	25 (41.7%)	
T4	3 (15.0%)	10 (50.0%)	7 (35.0%)	
N Stage				
N0	10 (25.0%)	16 (40.0%)	14 (35.0%)	0.040
N1	8 (26.7%)	12 (40.0%)	10 (33.3%)	
N2	5 (14.3%)	18 (51.4%)	12 (34.3%)	
N3	2 (11.1%)	9 (50.0%)	7 (38.9%)	
M Stage				
M0	20 (25.0%)	35 (43.8%)	25 (31.2%)	0.027
M1	5 (11.6%)	20 (46.5%)	18 (41.9%)	

Data presented as frequency (percentage) for each pathological feature by age group. Statistical significance determined using Chi-square tests with a p-value < 0.05 considered significant.

Total number of patients: n = 123.

DISCUSSION

Most cases of gastric cancer occur in older people; the average age of start is between 50 and 60 years old [10]. A family history of the disease affects up to or somewhat more than 10% of people with gastric cancer [11]. Therefore, having a family history of GC increases the chance of developing GC, irrespective of the prevalence of GC in any particular country. Furthermore, the probability of GC rises with the percentage of family affected by GC [12].

In our study on gastric cancer, males were more predominant than females. This finding is consistent with the existing literature, which consistently shows two times higher incidence of gastric cancer in men than in women [3, 13]. Males who have regular H. pylori infections, consume a lot of tobacco and alcohol, or work in stressful conditions are more likely to develop stomach

cancer [14]. In contrast, a meta-analysis reveals that chronic estrogen exposure, whether from ovarian sources or external therapy, may reduce the incidence of stomach cancer in women[15].
The most common comorbidity among patients with gastric cancer was hypertension (40.65%), which was followed by diabetes mellitus (28.46%) and chronic liver disease (9.76%). Similarly, among patients with stomach cancer in a Chinese study, hypertension affected people the most (29.52%), followed by diabetes (17.29%) and heart failure (10.37%)[16]. The similarity in comorbidity profiles between our study and the Chinese study suggests that hypertension, diabetes mellitus, and chronic conditions like heart failure are common risk factors across diverse populations with gastric cancer.
Our clinical presentation results are comparable with previous studies [17, 18], which showed that the most common symptom, reported in 70% of patients, was abdominal discomfort or epigastric pain. Of those who lost weight, 58% reported nausea and vomiting (32%). Early satiety and reduced appetite were reported in 30% of patients, dysphagia in 21%, and melaena in 17%. Heartburn was the least prevalent symptom, with 14% of patients experiencing it.
In our study, tumors larger than 5 cm were more frequently found in gastric cancer patients. The majority of patients with tumors smaller than 5 cm are between the ages of 40 and 60, but those with tumors larger than 5 cm are often older than 60. According to Zhou's findings, younger patients are more likely to have tumors that measure 2 to 5 cm [19]. Tang et al. (2021) observed that higher tumor sizes were associated with advanced stages of stomach cancer, indicating a bad prognosis [20], most likely due to the increased risk of metastasis and deeper penetration with larger tumors.
Our data showed that the most prevalent site of tumor was the antrum (35.77%), followed by the cardia (21.14%), which is comparable with many previous research [21, 22]. Cardia gastric cancer incidence is rising, particularly in Western countries, due to factors such as obesity and GERD. Non-cardia gastric cancer, on the other hand, is on the decline worldwide, owing primarily to decreased Helicobacter pylori infections and dietary modifications. Geographic differences suggest that cardia cancer is more common in Western countries, whereas non-cardia is more common in Eastern ones [6]. Moreover, this study found a significant association ($p < 0.045$) between the site of gastric cancer and the age of the patient, suggesting that individuals who are older are far more probable to have tumors in the distal portions of the stomach. This finding contradicted prior studies that revealed no such association [23].

Our analysis found that 43% of tumors were poorly differentiated, which is consistent with previous finding [24]. Moreover, the data also suggests that older patients are more likely to have well-differentiated tumors, as seen in the 64% of well-differentiated cases among patients over 60. In contrast, younger patients have a higher proportion of poorly differentiated tumors (24.5%). Halabi et al. found that older individuals are more likely to have well differentiated tumors, whereas younger patients frequently present with poorly differentiated tumor [25]. This differential implies that tumor differentiation may change with age, potentially impacting prognosis and treatment options in gastric cancer.

The results of the research show that the 40–60 age group is associated T, N, and M stages, indicating that this age range might be important for the development of the disease. The 40–60 group is clearly visible in both the T and N stages, particularly in T1, T2, N0, and N2. Likewise, this age group continues to be significant in the M stages, suggesting that age may have an impact on the dynamics of the disease. In a study by Liu et al, the proportion of T1 tumors in young patients was notably higher compared to middle-aged patients (25.8% vs. 17.5%), while the proportion of T4 tumors in young patients was significantly lower than in the middle-aged group[26]. The findings of this study indicate that age is an independent prognostic factor in patients with gastric cancer. According to the findings, taking age into account may provide additional information on cancer risk.

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