

## Research Article

# Trends in the Incidence and Location of Gastric Cancers: A Single Center Experience

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### Abstract

**Objectives:** This study examines trends in age, gender, tumor location, histology, stage, and treatment of gastric cancer patients at Kayseri City Hospital from 2018 to 2023.

**Methods:** Patients registered with ICD-10 code C16 from January 2018 to December 2023 were included. Data were analyzed retrospectively, excluding those without a malignant diagnosis or sufficient data. Patients were categorized by age, tumor location, histology, stage, and treatment type.

**Results:** The study included 804 patients (269 females, 535 males) with a mean age of  $62.69 \pm 13.04$  years. The most common tumor location was the antrum, pylorus, and incisura angularis. Histologically, 64.3% had adenocarcinoma, 16.8% had signet ring cell carcinoma, 4.2% had neuroendocrine tumors, and 5.7% had gastrointestinal stromal tumors. Diagnostic stages were 21.8% localized, 36.4% regional, 32.1% metastatic, and 9.7% unknown.

**Conclusion:** The study highlights trends in gastric cancer at Kayseri City Hospital. A decline in incidence since 2018, with the lowest in 2020, suggests the impact of the COVID-19 pandemic on hospital admissions. Gastric cancer was more common in males. An increase in metastatic stage diagnoses during the pandemic reflects delayed hospital visits. The findings emphasize the importance of early diagnosis and monitoring trends for better prevention and treatment strategies.

**Keywords:** Gastric cancer, incidence

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Gastric cancer constitutes an important health problem throughout the world and our country. It is the fifth most common cancer worldwide and has the fourth highest mortality rate.<sup>[1]</sup> In the recent cancer incidence studies in Turkey, it was reported that 13075 new cases were detected in 2020 and that it is the fifth most common cancer among all cancers.<sup>[1]</sup> Despite significant advances in cancer treatment, the survival rate in gastric cancer still remains low, which reveals the importance of prevention of gastric cancer.

The incidence of gastrointestinal cancers shows significant geographical differences. The highest incidence rates

of gastric cancer are in East Asia (Mongolia, China, Japan, South Korea) and Eastern Europe, while the lowest incidence rates are in North America, Northern Europe, Africa and South East Asia.<sup>[1,2]</sup>

Environmental factors play an important role in the aetiology of gastric cancer and risk factor exposure is thought to begin early in life. The main risk factors include smoking, alcohol, genetic factors, infection, diet and obesity.<sup>[3-5]</sup> In addition to advances in medicine, changes in lifestyle and environmental factors also affect the epidemiology of gastrointestinal cancers.

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The epidemiology, incidence and survival of gastric cancer are changing as gastric cancer screening programmes develop and treatments advance. Knowledge of these changes is important for healthcare professionals to manage gastric cancer patients more accurately and to plan appropriate strategies.

Increasing prevalence for all diseases may be due to better diagnosis, but may also be due to an actual increase in the incidence of the disease. Studies assessing trends in cancer incidence are essential for the development of up-to-date and evidence-based treatment guidelines. Assessing the impact of biological and environmental risk factors on cancer incidence may reveal important factors for cancer prevention and treatment.

In this study, we aimed to examine the age, gender, tumour location, tumour histology, stage and treatment of gastric cancer patients who applied to the Medical Oncology Out-patient Clinic of Kayseri City Hospital between 2018 and 2023. To the best of our knowledge, no previous study has analysed the trends in the incidence of gastric cancer in the Kayseri region according to specific characteristics.

## Methods

After obtaining local ethics committee approval for the study, the study included patients registered as C16 (gastric cancer) according to ICD-10 codes in Kayseri City Hospital between January 2018 and December 2023. All patients with a diagnosis code of C16, aged 18 years and older, were enrolled. Patient data were analysed retrospectively. After the pathology reports of the registered patients were examined, 150 patients who were diagnosed without a malignant diagnosis and 580 patients who did not have sufficient data records (applying for health board, applying only for examination request, operated and followed up in other centres) were excluded from the study. Patients were grouped according to age. The tumour location of the patients was categorised as cardia-fundus, corpus, antrum-pylorus-incisura and unclassifiable based on endoscopy and pathology reports. Histological features were determined as adenocarcinoma, signet ring cell carcinoma, neuroendocrine tumour (NET), gastrointestinal stromal tumour (GIST), intramucosal carcinoma and others based on the pathology reports. Invasive cancer limited to the organ of origin was staged as localised, regional if the tumour spread beyond the organ boundaries, metastatic if distant organ spread was present, and unknown. According to the treatment received within 5 months after the initial diagnosis, the patients were divided into 3 categories as surgical (surgery alone, surgery with chemotherapy, surgery with radiotherapy), non-surgical (chemotherapy only, chemora-

diotherapy or radiotherapy only) and unknown. Data collection and data analysis were performed in accordance with the Declaration of Helsinki and ethical standards.

## Statistical Analysis

Statistical analyses were performed using "IBM SPSS Statistics for Windows. Version 25.0 (Statistical Package for the Social Sciences, IBM Corp., Armonk, NY, USA)". Descriptive statistics are presented as n and % for categorical variables and Mean $\pm$ SD for continuous variables.

## Results

The study included 804 patients aged between 18-85 years. The mean age of the patients was 62.69 $\pm$ 13.04 years. 269 (33.5%) of the patients were female and 535 (66.5%) were male. The most common tumour location was antrum, pylorus and incisura angularis. This was followed by the corpus, then cardia and fundus. 517 (64.3%) patients had adenocarcinoma, 135 (16.8%) had signet ring cell carcinoma, 34 (4.2%) had NET, 46 (5.7%) had GIST and 57 (7.1%) had other pathological diagnoses. 493 (61.3%) of the patients had undergone surgery, 214 (26.6%) had not undergone surgery. The treatment of 97 patients (12.1%) was unknown. The data of the patients according to years are shown in Table 1.

Diagnostic stage; 175 (21.8%) patients were local, 293 (36.4%) regional, 258 (32.1%) metastatic and 78 (9.7%) unknown. The distribution of diagnostic stages according to years is shown in Figure 1.

The tumour location of the patients was 140 (17.4%) in the cardia-fundus region, 217 (27.0%) in the corpus, 314 (39.1%) in the antrum-pylorus or incisura region and 133 (16.5%) were unclassifiable. The distribution of tumour location according to years is shown in Figure 2.

The distribution of the age groups of the patients according to years is shown in Figure 3.

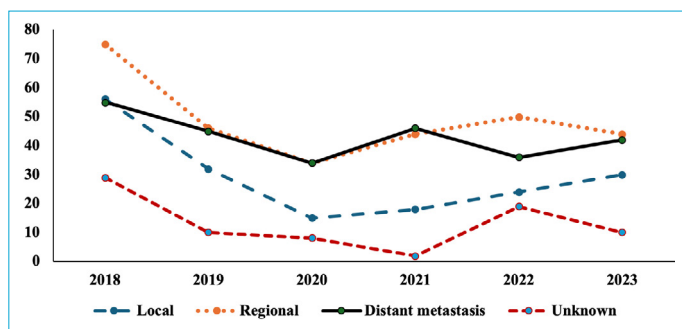
## Discussion

The incidence of gastric cancer varies geographically and is generally more common in resource-limited countries.<sup>[1]</sup> This heterogeneity is due to many factors, including environmental and genetic characteristics. In this study, current trends in gastric cancer, including incidence, tumour location, histology, histology, stage, and treatment options in Kayseri City Hospital between 2018 and 2023 were shown.

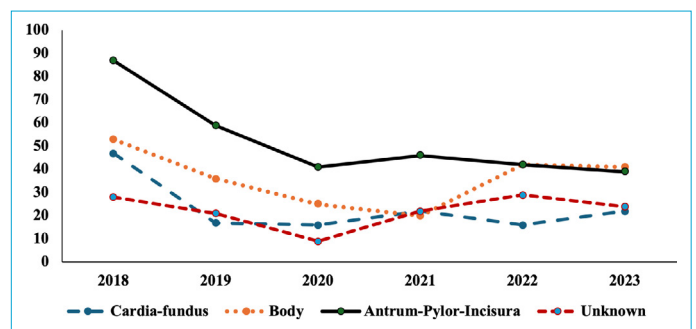
The global incidence of gastric cancer has declined rapidly in the last few decades.<sup>[6,7]</sup> The rate of decline in incidence also varies between countries and regions. This decline may be due to better recognition of certain risk factors such as h.pylori and environmental risk factors. In our study, when

**Table 1.** Evaluation of gastric cancer patients according to years

|                                | Total<br>n=804 | 2018<br>n=215 | 2019<br>n=133 | 2020<br>n=91 | 2021<br>n=110 | 2022<br>n=129 | 2023<br>n=126 |
|--------------------------------|----------------|---------------|---------------|--------------|---------------|---------------|---------------|
| Age, n (%)                     | 62.69±13.04    | 60.82±13.31   | 62.23±12.82   | 61.98±13.45  | 61.09±13.04   | 65.46±11.69   | 63.40±13.14   |
| 18-29                          | 8 (1.0)        | 4 (1.9)       | 0 (0)         | 0 (0)        | 3 (2.7)       | 0 (0)         | 1 (0.8)       |
| 30-39                          | 41 (5.1)       | 16 (7.4)      | 7 (5.3)       | 5 (5.5)      | 4 (3.6)       | 4 (3.1)       | 5 (4)         |
| 40-49                          | 90 (11.2)      | 16 (7.4)      | 18 (13.5)     | 10 (11)      | 18 (16.4)     | 10 (7.8)      | 18 (14.3)     |
| 50-59                          | 190 (23.6)     | 65 (30.2)     | 28 (21.1)     | 27 (29.7)    | 21 (19.1)     | 24 (18.6)     | 25 (19.8)     |
| 60-69                          | 251 (31.2)     | 68 (31.6)     | 41 (30.8)     | 26 (28.6)    | 39 (35.5)     | 38 (29.5)     | 39 (31)       |
| 70-79                          | 169 (21.0)     | 37 (17.2)     | 30 (22.6)     | 14 (15.4)    | 20 (18.2)     | 42 (32.6)     | 26 (20.6)     |
| 80≥                            | 55 (6.8)       | 9 (4.2)       | 9 (6.8)       | 9 (9.9)      | 5 (4.5)       | 11 (8.5)      | 12 (9.5)      |
| Gender, n (%)                  |                |               |               |              |               |               |               |
| Female                         | 269 (33.5)     | 80 (37.2)     | 45 (33.8)     | 20 (22)      | 39 (35.5)     | 39 (30.2)     | 46 (36.5)     |
| Male                           | 535 (66.5)     | 135 (62.8)    | 88 (66.2)     | 71 (78)      | 71 (64.5)     | 90 (69.8)     | 80 (63.5)     |
| Histology, n (%)               |                |               |               |              |               |               |               |
| Adenocarcinoma                 | 517 (64.3)     | 135 (62.8)    | 79 (59.4)     | 63 (69.2)    | 68 (61.8)     | 84 (65.1)     | 88 (69.8)     |
| Signet ring cell carcinoma     | 135 (16.8)     | 41 (19.1)     | 26 (19.5)     | 17 (18.7)    | 19 (17.3)     | 19 (14.7)     | 13 (10.3)     |
| NET                            | 34 (4.2)       | 7 (3.3)       | 3 (2.3)       | 3 (3.3)      | 5 (4.5)       | 8 (6.2)       | 8 (6.3)       |
| GIST                           | 46 (5.7)       | 22 (10.2)     | 11 (8.3)      | 1 (1.1)      | 4 (3.6)       | 2 (1.6)       | 6 (4.8)       |
| Intramucosal carcinoma         | 15 (1.9)       | 4 (1.9)       | 2 (1.5)       | 0 (0)        | 4 (3.6)       | 2 (1.6)       | 3 (2.4)       |
| Other                          | 57 (7.1)       | 6 (2.8)       | 12 (9)        | 7 (7.7)      | 10 (9.1)      | 14 (10.9)     | 8 (6.3)       |
| Location, n (%)                |                |               |               |              |               |               |               |
| Cardia-fundus                  | 140 (17.4)     | 47 (21.9)     | 17 (12.8)     | 16 (17.6)    | 22 (20)       | 16 (12.4)     | 22 (17.5)     |
| Body                           | 217 (27.0)     | 53 (24.7)     | 36 (27.1)     | 25 (27.5)    | 20 (18.2)     | 42 (32.6)     | 41 (32.5)     |
| Antrum-Pylor-Incisure          | 314 (39.1)     | 87 (40.5)     | 59 (44.4)     | 41 (45.1)    | 46 (41.8)     | 42 (32.6)     | 39 (31)       |
| Unknown                        | 133 (16.5)     | 28 (13)       | 21 (15.8)     | 9 (9.9)      | 22 (20)       | 29 (22.5)     | 24 (19)       |
| Stage, n (%)                   |                |               |               |              |               |               |               |
| Local                          | 175 (21.8)     | 56 (26)       | 32 (24.1)     | 15 (16.5)    | 18 (16.4)     | 24 (18.6)     | 30 (23.8)     |
| Regional                       | 293 (36.4)     | 75 (34.9)     | 46 (34.6)     | 34 (37.4)    | 44 (40)       | 50 (38.8)     | 44 (34.9)     |
| Metastatic                     | 258 (32.1)     | 55 (25.6)     | 45 (33.8)     | 34 (37.4)    | 46 (41.8)     | 36 (27.9)     | 42 (33.3)     |
| Unknown                        | 78 (9.7)       | 29 (13.5)     | 10 (7.5)      | 8 (8.8)      | 2 (1.8)       | 19 (14.7)     | 10 (7.9)      |
| Surgical Treatment, n (%)      |                |               |               |              |               |               |               |
| Surgical                       | 493 (61.3)     | 134 (62.3)    | 84 (63.2)     | 56 (61.5)    | 60 (54.5)     | 83 (64.3)     | 76 (60.3)     |
| Non-Surgical                   | 214 (26.6)     | 46 (21.4)     | 34 (25.6)     | 24 (26.4)    | 41 (37.3)     | 30 (23.3)     | 39 (31)       |
| No active treatment or unknown | 97 (12.1)      | 35 (16.3)     | 15 (11.3)     | 11 (12.1)    | 9 (8.2)       | 16 (12.4)     | 11 (8.7)      |



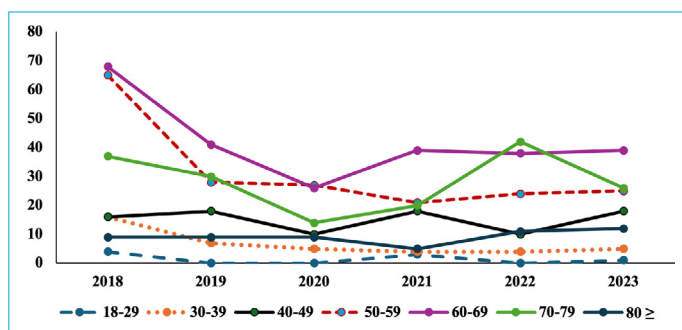
**Figure 1.** Distribution of diagnostic stages according to years.



**Figure 2.** Distribution of locations according to years.

we looked at the change over the years, we found that there was a decrease in incidence since 2018, and the lowest incidence was observed in 2020. It was thought that

the incidence was lower in this period due to the decrease in hospital admissions due to the covid-19 pandemic that started in March 2020 in Turkey.



**Figure 3.** Distribution of age groups according to years.

In both developed and undeveloped countries, the incidence of gastric cancer is higher in men than in women.<sup>[1]</sup> There are data suggesting that reproductive hormones may have a protective role in women.<sup>[8,9]</sup> Similarly, in our study, gastric cancer was found more frequently in men. This finding is also in line with the 2040 predictions of a study that explains that the incidence of GC worldwide is estimated to be two-thirds of all cases occurring in the male gender.<sup>[10,11]</sup>

In countries with both low and high incidence of gastric cancer, there has been an increase in the incidence of gastric cancer in young adults (<50 years of age).<sup>[12,13]</sup> Although the reason for this situation has not been clearly determined, it is thought that autoimmune gastritis and dysbiosis due to increased antibiotic and antacid use cause an increase in the incidence in young adults.

Gastric adenocarcinomas are the most common type of gastric cancer, accounting for approximately 95% of gastric cancers. Other pathological types such as adenosquamous, squamous and undifferentiated carcinomas are more rare.<sup>[14]</sup> The findings in our study were found to be compatible with these data.

The anatomical subgroup of GC may show regional differences. African-Americans, Indians and Hispanics have a higher risk of developing GC in the cardia, while non-cardia tumours are more common in Caucasians.<sup>[15]</sup>

Although there is a general decrease in the incidence of gastric cancer, an increase in gastric cardia cancers has been found.<sup>[16]</sup> In relation to this situation, it has been suggested that cardia carcinoma is a different entity from the rest of gastric cancer. Obesity and reflux are considered to be the main risk factors for gastric cardia cancers, while *Helicobacter pylori* infection is considered to be the main risk factor for non-cardia cancers.<sup>[17]</sup> In our study, the least common tumour among the classifiable tumours was cardia-fundus tumours, and the incidence of cardia tumours, which was highest in 2018, had a fluctuating course, although the incidence decreased afterwards.

The diagnosis of GC is often made during stage 3-4 disease,

when the probability of survival is lower.<sup>[18]</sup> In our study, the diagnostic stage of the patients was found to be the lowest in the local disease stage in accordance with the literature. The years 2020-2021 were the years when patients diagnosed in the metastatic stage were the most common and the number of patients diagnosed in the local disease stage was the lowest. This was thought to be related to the fact that patients ignored their symptoms due to the covid pandemic and their hospital admissions were delayed. With the end of the pandemic, it was observed that the number of patients diagnosed at the local stage was increasing. This may be thought to be related to advances in early diagnosis and treatment methods.

Current guidelines recommend radical gastrectomy and D2 lymph node dissection with at least 15 lymph node removal for stage IB-III disease.<sup>[19]</sup> Although surgical resection is accepted as curative treatment in gastric cancer, tumour recurrence is observed in most patients. In our study, we see that the surgical rate is similar over the years and the lowest surgery was performed in 2021. This was thought to be due to the highest number of patients diagnosed at the metastatic stage in 2021.

In conclusion, this study revealed the epidemiological trends in the incidence and clinicopathological features of gastric cancer in Kayseri City Hospital between 2018 and 2023. These results will help to understand the current status of gastric cancer in Kayseri.

## Disclosures

**Ethics Committee Approval:** The present study was approved by the Kayseri City Hospital Ethics Committees and was conducted in compliance with ICH-GCP rules and Declaration of Helsinki. Trial No. 896 Date. 22.08.2023.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

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