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**Original Article**

# Prevalence and Risk Factors of Various Gastrointestinal Malignancies

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## ABSTRACT

Gastrointestinal (GI) cancers are among the most common and fatal tumors worldwide, with incidence rates varying significantly due to factors such as inheritance, lifestyle, and diet. Understanding the prevalence and related risk factors is essential for improved prevention and treatment techniques. Data were collected from patients admitted to Baqaei Hospital during 2019 to 2022. The questionnaire includeddemographic data (age and sex), occupation, location of malignancy, genetic history, smoking habits, underlying disease (hypertension, diabetes, rheumatism), performing physical activities (exercise), presence of metastasis ,and complete survival status. The data analysis of this study was performed using statistical software: SPSS.Both linear regression and unadjusted logistic regression analyses were conducted. T-test and chi-square statistical methods were also used for analysis in this study. The results revealed that the survival rate in patients with gastrointestinal malignancies are significantly associated with factors such as age, family history, tumor location (colon and pancreas), history of smoking, concomitant disease, metastasis (rectal cancer), and physical activity. The average age of death is 66.05 years. Among them, approximately 20.4% had a family history of cancer. Also, 50% exhibited metastasis, 44.8% had a history of smoking, 74.8% had underlying diseases, and 99.6% had not exercised. Physical activity was significantly lower in deceased patients, and fewer deaths occurred among those with high physical activity levels. Rectal cancer had the highest percentage of metastasis among living and deceased patients. It will be useful to carry out more studies to determine the clinical and demographic factors that affect the survival of patients with colorectal cancer patients. Public awareness and early medical consultation are crucial for improving outcomes.

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## 1. Introduction

Gastrointestinal cancer involves a large number of cases that often leads to death. Metastases from the esophagus, stomach, liver, pancreas, gall bladder, colon, and rectum are the most prevalent locations of gastrointestinal cancer (1). These cancers account for approximately37% of all cancer-related deaths worldwide (2). In Iran, gastrointestinal cancers are highly prevalent, with 20,719 deaths, comprising 44.4% of all cancer-related mortalities. Stomach cancer is the most common cancer among men in Iran and ranks third after breast and colorectal cancer in women (3). It is the leading cause of death from gastrointestinal cancers, followed by esophageal and colorectal neoplasms (4).

Factors contributing to the development of gastrointestinal cancers include dietary habits such as salty foods and processed foods, low consumption of vegetables and fruits, a sedentary lifestyle, smoking, alcohol use, advanced age, male gender, family history of cancer, and Helicobacter pylori infection (5, 6).

Also, rapid industrialization and urbanization, particularly in large cities, have increased pollution levels, further elevating cancer risks (5). Finally, all these factors increase the incidence of gastrointestinal cancers (7). These cancers are particularly significant due to their prevalence, high mortality rates, and their prominence among other cancer types (5).The challenges associated with the treatment of many types of cancer, along with the high costs involved, have placed a significant burden on national health budgets (5). Early and timely diagnosis of gastrointestinal cancers, particularly through endoscopy, is crucial as it can significantly improve patient survival rates and reduce treatment costs (8-10). Given the increasing incidence and mortality rates associated with gastrointestinal cancers, this study aims to investigate the prevalence and risk factors of various gastrointestinal malignancies in patients at Baqaei 2 Hospital in Ahvaz.

## 2. Materials and Methods

### 2.1. Data Collection

In this retrospective study, data related to primary gastrointestinal tract cancers were obtained from the archived patient files at the Health Technology Unit of Baqaei Hospital 2, covering four years from 2019 to 2022.

### 2.2. Methodology

The questionnaire collected comprehensive patient information, including demographic data (age and sex), occupation, location of malignancy, family history of cancer, tobacco use (smoking and other types), alcohol consumption, underlying conditions (such as hypertension, diabetes, and rheumatism), physical activity (exercise), presence of metastasis, and survival status (alive/deceased). The collected data were then analyzed statistically.

### 2.3. Statistical Analysis

#### 2.3.1. Statistical software

SPSS, linear regression, and unadjusted logistic regression were used for data calculation and analysis. Also, the study's participants were described using the mean and standard deviation in the presence of continuous data , the number ,and percentage in the presence of classified data. T-test and chi-square statistical methods were also used for analysis in this study. Significance levels were considered 0.05.

## 3. Results

In this four-year study, data from 999 patients with various types of gastrointestinal malignancies were analyzed. The results indicated that the average age of deceased patients was 66.05 years, while the average age of surviving patients was 56.29 years, with a significant difference between the two groups ($P<0.05$). Among the patients, 432 were female (43.3%) and 567 were male (56.7%).

Further analysis revealed a significant relationship between patient survival and factors such as family history, smoking, underlying disease, metastasis, physical activity, occupation and tumor location ($P<0.05$). Additionally, survival rates were lower in patients with a positive family history, smoking habits, underlying disease, metastasis, lack of physical activity, and malignancies identified in the colon and pancreas (Table 1).

An analysis of the predictors of mortality in individuals with gastrointestinal cancer revealed that age, tumor location, family history of cancer, smoking habits, underlying diseases, and metastasis are significantly associated with cancer-related death. This study also found that the presence of gastrointestinal cancers in first- and second-degree relatives plays a crucial role in the development of these malignancies (Table 2).

Metastases to the esophagus, stomach, colon, bones, liver, and lungs were associated with higher mortality in patients, whereas metastases to the kidneys were associated with the lowest death rate.

**Table 1.** Baseline characteristics of participants.

| Variable | | alive | dead | p-value |
|---|---|---|---|---|
| | | N=729 | N=270 | |
| **age** | | 56.29 (14.42) | 66.05 (15.62) | <0.001 |
| **sex** | female | 327 (44.9%) | 105 (38.9%) | 0.098 |
| | male | 402 (55.1%) | 165 (61.1%) | |
| **Family history** | negative | 676 (92.7%) | 215 (79.6%) | <0.001 |
| | positive | 53 (7.3%) | 55 (20.4%) | |
| **smoking** | no | 612 (84.0%) | 149 (55.2%) | <0.001 |
| | yes | 117 (16.0%) | 121 (44.8%) | |
| **background disorder** | no | 528 (72.4%) | 68 (25.2%) | <0.001 |
| | yes | 201 (27.6%) | 202 (74.8%) | |
| **metastasis** | negative | 686 (94.1%) | 135 (50.0%) | <0.001 |
| | positive | 43 (5.9%) | 135 (50.0%) | |
| **exercise** | no | 698 (95.7%) | 269 (99.6%) | <0.001 |
| | yes | 31 (4.3%) | 1 (0.4%) | |
| **occupation** | disable | 1(0.14) | 10(3.70) | <0.001 |
| | freelance | 118(16.19) | 37(13.70) | |
| | retired | 109(14.95) | 45(16.67) | |
| | jobless | 151(20.71) | 72(26.67) | |
| | housekeeper | 310(42.52) | 96(35.56) | |
| | studying | 7(0.96) | 1(0.37) | |
| | employee | 33(4.53) | 9(3.33) | |
| **tumor place** | appendix | 3(0.41%) | 1(0.37%) | <0.001 |
| | pancreas | 29(3.98%) | 78(28.89%) | |
| | small intestine | 1(0.14%) | 0(0.00%) | |
| | rectum | 56(7.68%) | 12(4.44%) | |
| | esophagus | 60(8.23%) | 16(5.93%) | |
| | gastric | 209(28.67%) | 45(16.67%) | |
| | neuroendocrine | 0(0.00%) | 1(0.37%) | |
| | hepatoblastoma | 8(1.10%) | 2(0.74%) | |
| | liver | 43(5.90%) | 20(7.41%) | |
| | colon | 299(41.02%) | 90(33.33%) | |
| | gallbladder | 21(2.88) | 5(1.85) | |

**Table 2.** Family history of cancer in first and second-generation.

| Family history | Live situation | | |
|---|---|---|---|
| **Negative** | Dead (%) | Alive (%) | Total (%) |
| | 215(79.63) | 676(92.73) | 891(89.19) |
| **pancreas first** | 1(0.37) | 0(0) | 1(0.10) |
| **breast first** | 10(3.70) | 12(1.65) | 22(2.20) |
| **breast second** | 0(0) | 1(0.14) | 1(0.10) |
| **prostate first** | 2(0.74) | 4(0.55) | 6(0.60) |
| **ovary first** | 10(3.70) | 4(0.55) | 14(1.40) |
| **uterus first** | 1(0.37) | 1(0.14) | 2(0.20) |
| **rectum first** | 2(0.74) | 0(0) | 2(0.20) |
| **lung first** | 1(0.37) | 1(0.14) | 2(0.20) |
| **leukemia first** | 2(0.74) | 2(0.27) | 4(0.40) |
| **esophagus first** | 6(2.22) | 5(0.69) | 11(1.10) |
| **esophagus second** | 0(0) | 1(0.14) | 1(0.10) |
| **gastric first** | 9(3.33) | 12(1.65) | 21(2.10) |
| **liver first** | 2(0.74) | 0(0) | 2(0.20) |
| **colon first** | 9(3.33) | 9(1.23) | 18(1.80) |
| **gallbladder first** | 0(0) | 1(0.14) | 1(0.10) |
| **Total** | 270 | 729 | 999 |
| | 100.00 | 100.00 | 100.00 |

## 4. Discussion

Considering the high prevalence of gastrointestinal cancers in Iran, particularly esophageal and stomach cancer, this study aimed to investigate the prevalence and risk factors of various types of gastrointestinal malignancies in patients at Baqaei 2 Hospital. The findings showed that the survival rate across all types of gastrointestinal cancers significantly correlated with age, with higher mortality observed in older patients. A study by Ebrahimi et al. in 2024, which investigated the mortality trends of gastrointestinal cancers in Babol, Northern Iran (2011-2013), also showed that the mortality rate in gastrointestinal cancers increases with age (11). Similarly, Salemzadeh et al., (2018) in a study titled "The Annual Mortality Trend of Gastrointestinal Cancers in Iran during the Years 1990 to 2015," used data from the Iranian Civil Registration System (1995 to 2010) and two cemeteries in Tehran (1995 to 2010) and Isfahan (2007 to 2010). The study found that cancer mortality from all causes increased with age and was more prominent in adults aged 50 years or beyond (8), consistent with the results of our study, where the mortality rate of most malignancies increases with age.

In the present study, a comparison of survival rates among patients with gastrointestinal malignancies based on family history revealed a significant relationship between survival rate and family history. Similarly, Ghasemi et al. (2023) reported a significant relationship between patient survival and a family history of cancer (12).

Yousefi et al. (2018), in a review study titled "Risk Factors for Gastric Cancer," in 2017, performed a structured overview using databases such as Science Direct, Scopus, PubMed, Cochrane, and Web of Science (ISI). This study identified and categorized 52 risk factors for stomach cancer into nine major categories: diet, lifestyle, genetic predisposition, family history, medical treatments and conditions, infections, demographic characteristics, occupational exposures, and ionizing radiation (13). These findings support our observations.

Regarding smoking, our analysis revealed a significant inverse relationship between smoking history and patient survival. Chen et al. (2024) conducted a study on the prevalence, types, and risk factors of gastrointestinal tract diseases in Hainan Province, China. They concluded that smoking significantly reduces the survival rate of patients with gastrointestinal malignancies (14). Similarly, Wong et al. (2019) reported that non-modifiable factors such as genetic predisposition, ethnicity, age, gender, family history, smoking habits, alcohol consumption, weight (BMI), Western diet, low physical activity, chronic diseases, and microbiota influence the prevalence and risk factors of colorectal cancer in Asia (15), which is consistent with our findings. Although the exact mechanism linking smoking to gastrointestinal symptoms is not fully understood, previous studies have established a connection between smoking and various gastrointestinal disorders, including gastroesophageal reflux disease, esophageal cancer, gastric ulcers, and gastric cancer (16).

Our study also indicated a significant relationship between survival rates and the presence of underlying diseases and comorbidities, with a notably higher percentage of comorbidities observed in deceased patients. A 2021 study titled "Prevalence and Risk Factors of Upper Gastrointestinal Cancers during Endoscopy" cancers diagnosed less than 6 months after endoscopy were considered "common". While those diagnosed between 6 and 36 months were categorized as "missed". The study found that esophageal adenocarcinomas were missed more frequently than squamous cell cancers (6.1% vs. 4.2%), with a relative risk of 1.4. Additionally, most gastric cancers were adenocarcinomas, with 5.7% classified as missing. This study identified comorbidities as a significant risk factor for gastrointestinal malignancies (17).

In this research, the survival rate of patients with gastrointestinal malignancies was significantly related to the presence of metastasis, with a notably higher percentage of positive metastases observed in deceased patients. Various studies have highlighted that tumor size and the number of involved lymph nodes are critical factors, affecting patient survival. As tumor size and the number of involved lymph nodes increase, the likelihood of metastasis rises, ultimately reducing patient survival rates (18, 19). These findings highlight the importance of early detection and treatment, as patients who are unaware of their disease in its initial stages are more likely to experience disease progression and metastasis. Effective strategies to prevent metastasis are crucial for improving patient outcomes.

The findings of the present study indicated a significant relationship between survival rates of patients with gastrointestinal malignancies and physical activity. Deceased patients exhibited notably lower levels of

physical activity. Vishwanath et al. (2024) reported that lifestyle, genetics, and environmental factors contribute significantly to the rising incidence of gastrointestinal malignancies among younger populations, since physical activity is associated with increased survival rates in these patients (20).

In our study, examining the survival rates of patients with various types of gastrointestinal malignancies based on the primary tumor location revealed a significant relationship between these variables. In both patient groups, colon tumors were the most prevalent, while pancreatic cancer was more significantly associated with deceased patients. Ebrahimi et al. (2024) observed a significant relationship between tumor location and survival, with the highest rates of malignancy found in the colon and pancreas, which notably affected survival rates (11).

Additionally, Alhazmi et al. (2020) conducted a case-control study titled "Prevalence and Patterns of Gastrointestinal Cancers in Obese Patients" at a teaching hospital in Saudi Arabia. Using medical records of adult patients diagnosed with gastrointestinal cancer from January 2010 to May 2018 at King Abdulaziz University Hospital, the study included 532 patients. It found that colorectal cancer was the most common tumor site in obese patients, followed by gastric and pancreatic cancers (21), which is consistent with the findings of the present study. Finally, the distribution of metastasis among the patients in the present study showed that the highest percentage of metastasis, both in deceased and surviving patients, were in the rectum. Based on the study by Rosenberg et al. rectal tumors have a worse prognosis than colon tumors (22), which is consistent with the present study.

The results of this present study indicated that survival rates in patients with gastrointestinal malignancies are significantly related to several factors, including age, family history, tumor location (particularly colon and pancreas), smoking history, comorbidities, metastasis (notably in rectal cancer), and physical activity. Rectal cancer was exhibited the highest percentage of metastasis among both living and deceased patients. To better understand the clinical and demographic factors affecting the survival of patients with colorectal cancer, further research is warranted. Additionally, public awareness to promote early medical consultation and timely diagnostic procedures is essential.

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**Authors' Contribution**

Study concept and design, administration of technical and material support, and study supervision: R. SK, A. A.
Data acquisition: M. HR, F. N.
Analysis and interpretation of data, statistical analysis: S. B.
Drafting of the manuscript and critical revision for important intellectual content: V. R, R. SK.

**Ethics**

This study was approved by the ethics committee under the code IR.AJUMS.REC.1402.086, at Jundishapur University of Ahvaz.

**Conflict of Interest**

The authors declare no conflicts of interest related to this study.

**Data Availability**

The data supporting the findings of this study are available on request from the corresponding author.

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