Prevalence and risk factors of various gastrointestinal malignancies

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Abstract

Gastrointestinal (GI) cancers are among the most common and fatal tumors globally, with significant variation in incidence caused by factors such as inheritance, lifestyle, and diet. Understanding the prevalence and related risk factors is essential for improving preventative and treatment techniques.

Data was collected from patients admitted to Baqaei Hospital from 2019 to 2022. The questionnaire included: demographic data (age and sex), occupation, location of malignancy, genetic history, occupation of the patient, smoking, underlying disease (hypertension, diabetes, rheumatism), performing physical activities (exercise), presence of metastasis to other areas and complete survival became. The data analysis of this study was done by statistical software: SPSS, linear regression and unadjusted logistic regression were calculated and analyzed. T-test and chi-square statistical methods were also used for analysis in this study.

The results of this study showed that the survival rate in patients with gastrointestinal malignancies has a significant relationship with age, family history, tumor location (colon and pancreas), history of smoking, concomitant disease, metastasis (rectal cancer), and physical activity. The average age of death people is 66.05 years. Among them, approximately 20.4% had a type of cancer according to family history. Also, 50% had metastasis, 44.8% had smoking, 74.8% had background disorder, and 99.6% had not exercised. Physical activity was significantly lower in deceased patients, and fewer deaths occurred in people 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, so it is necessary to inform the public to consult a doctor as soon as possible and do examinations.

Keywords: prevalence, risk factors, gastrointestinal tract malignancy

1. Introduction

Gastrointestinal cancer includes a large number of cancer patients, which leads to their death (1). Metastases from the esophagus, stomach, liver, pancreas, gall bladder, colon, and rectum are the most prevalent locations of gastrointestinal cancer (2). These cancers account for 37% of all cancer-related deaths worldwide (3) It was reported that gastrointestinal cancers are highly prevalent, contributing to 20,719 deaths, which constitute 44.4% of all cancer-related mortalities in Iran. Stomach cancer is the most common cancer among men in Iran and ranks third after breast and colorectal cancer among women (4). It is the leading cause of death from gastrointestinal cancers, followed by esophageal and colorectal neoplasms (5).

Dietary habits such as salty foods and processed foods along with low consumption of vegetables and fruits, a sedentary lifestyle, smoking, alcohol use, advanced age, male gender, family history of cancer, and Helicobacter pylori infection have strongly contributed to developing gastrointestinal cancers (6, 7). Also, rapid industrialization and urbanization, particularly in large cities, have increased pollution, with cancer being one of its most severe consequences (6). Finally, all these factors increase the incidence of gastrointestinal cancers (8). These cancers are particularly significant due to their prevalence, high mortality rates, and their prominence among other cancer types (9).

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 (10-12). Given the increasing incidence and mortality rates associated with gastrointestinal cancers, this study was conducted to investigate the prevalence and risk factors of various gastrointestinal malignancies in patients at Baqaei 2 Hospital in Ahvaz.

2. Material and methods

2.1. Data collecting

In this retrospective study, data related to primary gastrointestinal tract cancers were extracted 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 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 using statistical software.

2.3. Statistical Analysis

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 and 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 ($P<0.05$). Of 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, type of employment, and tumor location ($P<0.05$). Additionally, survival rates were lower in patients with a positive family history, smoking, underlying disease, metastasis, lack of physical activity, and malignancies in the colon and pancreas (Table 1).

Table 1: Baseline characteristics of participants

Variable		alive N=729	dead N=270	p-value
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)	

An analysis of the predictors of mortality in individuals with gastrointestinal cancer revealed that age, tumor location, family history of cancer, smoking, 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).

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

Family history	**Live situation**		
	Dead (%)	Alive (%)	Total (%)
Negative	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

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.

4. Discussion

Considering the high prevalence of gastrointestinal cancers in Iran and the significant prevalence of esophageal and stomach cancer, this study was conducted to investigate the prevalence and risk factors of various types of gastrointestinal malignancies in patients at Baqaei 2 Hospital. Based on age in the present study, the survival rate in all types of gastrointestinal malignancies in patients referred to Baqaei 2 Hospital shows a significant difference between the average age of the two groups of patients, with the average age of deceased patients being significantly higher. A study by Ebrahimi et al. in 2024, which investigated the mortality trend of gastrointestinal cancers in Babol, Northern Iran (2011-2013), showed that the mortality rate in gastrointestinal cancers increases with age (13). In 2018, Salemzadeh et al., 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 older (14), which is 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.'s 2023 study found a significant association between patient survival and a family history of cancer (15).

Yousefi et al. (2018), in a review study titled "Risk Factors for Gastric Cancer," conducted 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 exposure, and ionizing radiation (16). These findings are consistent with the results of our study.

In our study, examining the survival rates of patients with various gastrointestinal malignancies based on smoking history revealed a significant relationship between survival rates and smoking.

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 (17). Similarly, Wong et al. (2019) reported that non-modifiable factors such as genetic predisposition, ethnicity, age, gender, family history, smoking, alcohol consumption, weight, Western diet, low physical activity, chronic diseases, and microbiota influence the prevalence and risk factors of colorectal cancer in Asia (18), which aligns 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 (19).

Our study found a significant relationship between survival rates and the presence of underlying diseases and co-morbidities, with a notably higher percentage of co-morbidities observed in deceased patients. In 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 (20).

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 (21-22). These findings underscore 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, with physical activity being associated with increased survival rates in these patients (23).

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 the two 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 impacted survival rates (13). 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 (24), which aligns with the findings of the present study. Finally, the distribution of the frequency of metastasis in the patients of the present study showed that the highest percentage of dead and surviving metastasis was in the rectum. In the study of Rosenberg et al., rectal tumors have a worse prognosis than colon tumors (25), which is consistent with the present study.

The results of the 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, comorbid conditions, metastasis (notably in rectal cancer), and physical activity. Rectal cancer was found to have 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 should be increased to encourage early medical consultation and timely examinations.

Author's contribution

RSK and AA: Study concept and design, administration of technical and material support, and study supervision.

MHR and FN: Data acquisition.

SB: Analysis and interpretation of data, statistical analysis.

VR and RSK: Drafting of the manuscript and critical revision for important intellectual content.

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Conflict of interest

The authors declare no conflicts of interest related to this study. This study was approved by the ethics code IR.AJUMS.REC.1402.086, at Jundishapur University of Ahvaz.

Data Availability

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

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