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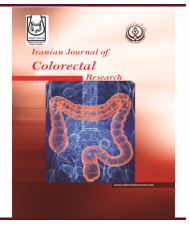

Factors Affecting 5-Year Mortality of Colon Cancer in a Single Center

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Abstract

Introduction: Colon cancer is considered one of the most lethal cancers globally, and various factors are thought to be associated with the survival rate of this disease. Identifying these factors is helpful in better management, efficient treatment, and increased patient survival. Therefore, this study aimed to investigate the relationship between demographic, clinical, and laboratory findings of colon cancer patients and their 5-year mortality rates.

Methods: A retrospective study was conducted on 54 patients diagnosed with colon cancer, and their demographic data, comorbidities, clinical and laboratory data were collected. The Spearman non-parametric statistical correlation test was utilized to analyze the relationships between these variables and the 5-year mortality of colon cancer. A P-value<0.05 was considered statistically significant.

Results: The mean age of the patients was 60±12 years. A significant relationship was detected between carcinoembryonic antigen (CEA) level, recent significant weight loss, and pathological stage with the 5-year mortality of colon cancer. However, no statistically significant relationship was found between the 5-year mortality of colon cancer and comorbidities, age, gender, anatomical location of cancer, number of postoperative chemotherapy sessions, type of surgery, degree of tumor differentiation, lymphocyte count, serum albumin level, hemoglobin level, or need for emergency surgery.

Conclusion: CEA level, significant weight loss, and pathological stage of tumors may affect the 5-year mortality of colon cancer.

Keywords: Colon Cancer; Mortality; Survival Rate

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Introduction

Colorectal cancer (CRC) is a prevalent and fatal form of cancer worldwide, ranking as the third most common cancer in males and second in females (1). However, this might be different in various regions, such as in Iran where it is reported as the third most common cancer in women and fifth in men (2). Colon cancer is often accompanied by rectal cancer, collectively known as CRC. Of the 151,030 newly diagnosed large bowel cancers per year, 106,180 are colon cancer and the remainder are rectal cancers (3).

Various risk factors have been identified for colon cancer, including non-modifiable factors such as race, ethnicity (4, 5), age, and gender (6),

as well as ulcerative colitis, Crohn disease, cystic fibrosis, cholecystectomy, diabetes, androgen deprivation therapy, and abdominal radiation (7). Other modifiable risk factors include obesity (8), physical inactivity, diet (9), smoking (10), alcohol consumption (11), and several other factors (1).

Prognosis of colon cancer varies across nations but has improved with advancements in treatment, resulting in decreased mortality rates (7). The 5-year mortality rate of colon cancer is associated with TNM (Tumor, Node, Metastasis) stage, grade of differentiation, histology subtype, patient age, and anatomical location of the colon cancer (12). Right side colon cancer has been found to have a higher mortality rate than left side colon cancer (13). Age (14), gender (15), and serum markers such as carcinoembryonic antigen (CEA) and albumin (16) have also been linked to prognosis, although the data on these relationships are not consistent.

Identifying risk factors for CRC is significantly useful in planning for prevention and better management of the disease. As previously mentioned, various factors affecting CRC prognosis, prevalence, and outcomes differ across the world. Determining the risk factors that affect the mortality and outcomes of patients with colon cancer in Iran provides a more accurate understanding of the epidemiological characteristics of colon cancer, paving the way for improved disease management. The aim of this study was to evaluate the factors influencing 5-year mortality in patients with colon cancer.

Patients and Methods

This retrospective study included 54 patients with colon cancer who were referred to Modares Hospital, Tehran, Iran, with a diagnosis of colon cancer between 2009 and 2014. The protocol and consent forms were approved by the institutional review board at Shahid Beheshti University of Medical Sciences (Code: IR.SBMU.MSP.REC.1398.323). Exclusion criteria were patients who had colon cancer for more than five years and mortality unrelated to colon cancer. Demographic, clinical, and laboratory data were collected, including demographic data, comorbidities, anatomical location of the cancer, number of postoperative chemotherapy sessions, type of surgery, degree of tumor differentiation, lymphocyte count, serum albumin level, hemoglobin level, need for emergency surgery, pathological stage (TNM) of the disease, recent significant weight loss, and CEA. The relationship between this information and five-year mortality of patients was measured. Five-years mortality is defined as the incidence of death in the studied population five years from the diagnosis of colon cancer. Data were analyzed using SPSS software. Quantitative data were expressed as mean±standard deviation (SD), and qualitative data as frequency (percentage). The Spearman non-parametric statistical correlation test was used to analyze relationships. Statistical significance required a P value<0.05 for all analyses.

Results

The study included 54 patients diagnosed with colon cancer, with a mean age of 60±12 years. Of these, 28 (51.8%) were men and 26 (48.2%) were women. Postoperative chemotherapy was administered to 36 patients. The mean white blood cell count was [9.1±4.7]*10^3/µL, the mean count of lymphocytes was 1852±1423 /µL, the mean hemoglobin level was 10.8±1.9 g/dL, and the mean level of Alb was 3.4±0.8 g/dL. Recent weight loss was reported in 59.3% of the patients. Diabetes was the most common disease among the patients (20.3%), followed by hypertension (18.5%) and ischemic heart disease (18.5%, Table 1).

The sigmoid colon was the most common site of mass on colonoscopy (72.2%), followed by right and left colon tumors (18.5% and 9.3%, respectively). The most common surgeries were sigmoidectomy (53.7%), total colectomy (24.1%), right hemicolectomy (14.8%), and left hemicolectomy (7.4%). Elective surgeries were performed on 28 patients and emergency surgeries in 26 patients.

The course of the disease showed that 28 patients (53.6%) died, with systemic recurrence observed in 26 patients and local recurrence in 2 patients, while 17 patients (31.4%) survived. The status of 9 patients (16.8%) could not be determined due to an inability to contact them. Tumors with the pathological stage of T3N0M0 were the most common (28.6%), followed by T3N2M0 and T3N1M0 (24.5% and 12.2%, respectively).

Table 1: The comorbidities of colon cancer patients

Comorbidity	N (%)	Comorbidity	N
DM	11 (20.3)	KT	1 (1.8)
HTN	10 (18.5)	Breast cancer	1 (1.8)
IHD	10 (18.5)	TAH	1 (1.8)
HLP	4 (5.5)	BSO	1 (1.8)
Asthma	3 (4.7)	Alzheimer	1 (1.8)
IBD	2 (3.7)	Hypothyroidism	1 (1.8)
CVA	2 (3.7)	CLL	1 (1.8)
MPGN	1 (1.8)		

DM: Diabetes mellitus, HTN: Hypertension, IHD: Ischemic heart disease, HLP: Hyperlipidemia, IBD: Inflammatory bowel disease, CVA: Cerebrovascular accident, MPGN: Membranoproliferative glomerulonephritis, KT: Knee transplant, TAH: Total abdominal hysterectomy, BSO: Bilateral salpingo-oophorectomy, CLL: Chronic lymphocytic leukemia

Table 2: Factors affecting tumor cancer mortality

Factors	P value	Factors	P value
Comorbidities	0.063	Albumin Level	0.809
Age	0.614	Hb level	0.614
Gender	0.789	Emergency surgery	0.119
Tumor Location	0.818	TNM	0.026*
Chemo sessions	0.488	Weight Loss	0.018*
Surgery Type	0.279	CEA level	0.022*
Tumor differentiation	0.356	Lymphocyte Count	0.656

CEA: Carcinoembryonic antigen, Hb: Hemoglobin, TNM: Tumor, Node, Metastasis. The Spearman non-parametric statistical correlation test was used. *P value<0.05 was considered as significant.

Well-differentiated adenocarcinoma was observed in 55.6% of the patients, while moderately-differentiated adenocarcinoma was observed in 35.2%.

The relationship between 5-year mortality of colon cancer and comorbidities (P=0.063), age (P=0.614), gender (P=0.789), anatomical location of the cancer (P=0.818), the number of postoperative chemotherapy sessions (P=0.488), type of surgery (P=0.279), degree of tumor differentiation (P=0.356), lymphocyte count (P=0.656), serum albumin level (P=0.809), hemoglobin level (P=0.614), and need for emergency surgery (P=0.119) was not statistically significant.

The relationship between 5-year mortality of colon cancer and pathological stage (TNM) of the disease (P=0.026), recent significant weight loss (P=0.018), and the CEA level (P=0.022) was statistically significant (Table 2).

Discussion

Numerous studies have investigated factors associated with colon cancer mortality. The current study revealed that the 5-year mortality in colon cancer patients was significantly related to pathological stage of the disease, recent significant weight loss and the CEA level.

Similar to our findings, in a retrospective study in 2018 on 2,406 patients with colon cancer, body weight loss was associated with overall survival as well as tumor location, size and depth (17). Similarly, Walter *et al*. found that a major decrease in body mass index was a strong predictor of decreased survival in 3,130 CRC patients (18). Significant weight loss may indicate the severity and high stage of the disease, which could explain the poor prognosis of colon cancer in patients with significant weight loss (18).

Our study also showed that CEA level was considerably related to the 5-year mortality of colon cancer. CEA is recommended for postoperative follow-up of CRC patients and is used in prognostic models of CRC (19). Several studies have demonstrated the prognostic value of CEA in colon and rectal cancer (16, 19-21). TNM staging is the gold standard for determining the prognosis of colon cancer (22), as it helps identify the local and distant extension of the tumor, which is related to disease outcome (23, 24). Accordingly, we found a significant relationship between 5-year mortality in colon cancer and TNM staging of the disease in our population.

Our findings revealed no significant relationship between 5-year mortality of the disease and gender of the patients. Previous studies have reported inconsistent gender differences in CRC mortality. A study has reported higher CRC mortality in women than men (25), while another study has indicated higher mortality in men (1). In an observational study in Iran by Vakili *et al*., no difference between genders in probability of CRC survival at 1, 5, and 10 years were reported (26). Differences in population and nations may explain these different findings.

Our results showed that there was no significant relationship between age and 5-year mortality of the patients. However, Eeghen *et al*. performed a study on 392 CRC patients in the Netherlands between 2002 to 2008 and indicated that age was a significant predictor for overall survival in colon cancer patients (27). On the other hand, a retrospective analysis of a large multi-institutional database in Unites States in 2014 involving 7,948 CRC patients found that age less than 50 was not associated with survival but was associated with advanced stage and high recurrence rates (14). These discrepancies in findings could be attributed to demographic differences among the study populations, such as differences in mean age.

It is demonstrated in the present study that anatomical location of the colon cancer had no significant relationship with 5-year mortality of colon cancer. However, previous studies have consistently demonstrated that right-sided colon cancer has a worse prognosis and lower survival rates compared to left-sided colon cancer (13, 28, 29). The small sample size in our study may have contributed to the lack of a significant relationship between tumor location and 5-year mortality rates.

Several limitations should be acknowledged in our study. The small sample size and inability to access nine patients may limit the generalizability of our findings to larger populations. Additionally, the retrospective nature of our study only allowed for the identification of relationships and not causation. Therefore, further studies with larger sample sizes are recommended to confirm our findings.

Conclusion

The present study's findings demonstrate a significant association between CEA levels, recent significant

weight loss, and pathological stage with 5-year mortality in colon cancer patients. These factors may be utilized as prognostic indicators for predicting the prognosis of colon cancer patients.

Authors' Contribution

A.Z, H.E, M.T and T.R contributed in study concept and design, data acquisition and writing the manuscript. All authors have reviewed and approved the final version and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Conflict of interest: None declared.

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