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ORIGINAL ARTICLE

Epidemiological Survey of Colorectal Cancer Mortality in Hospitalized Patients in the Medical-educational Centers in Hamadan, Iran, during 2017-2018

Marzieh Barzegar[1], Hiva Azami[2], Mehrdad Maleki Jamasbi[3], Banafsheh Samari[1], Aliakbar Soleymanlou[4], Sajjad Amiri Bonyad[1]

[1] Student Research Committee, School of Nursing and Midwifery, Hamadan University of Medical Sciences, Hamadan, Iran

[2] Department of Medical - Surgical Nursing, School of Nursing and Midwifery, Hamadan University of Medical Sciences, Hamadan, Iran

[3] Department of Nursing, School of Nursing and Midwifery, Hamadan University of Medical Sciences, Hamadan, Iran

[4] Student Research Committee, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

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Abstract

Introduction: The third most common cause of cancer-related mortality is colorectal cancer showing an upward trend in developed countries. Therefore, studying epidemiological indicators related to mortality is crucial for better identification and management of this disease. Accordingly, the present study aimed to conduct an epidemiological survey of colorectal cancer mortality among hospitalized patients in medical-educational centers in Hamadan, Iran.

Methods: In this descriptive cross-sectional study, data were collected from patients who died (n=53) using a census method and a researcher-developed checklist. The variables under study included demographic data, including age, sex, marital status, and educational attainment, occupation, family history of colorectal cancer, place of residence, history of other diseases, site of tumor involvement, disease stage, type of disability caused by the disease, the patient's condition regarding colorectal surgery, number of cardiopulmonary resuscitations, number of days hospitalized, timing of cardiopulmonary resuscitation, and time of death. Descriptive statistics were utilized to analyze the data with the help of SPSS (version 16).

Results: In the present study, the highest mortality rate was associated with tumor involvement in the ascending colon, with a frequency of 27 cases (51%). In addition, 61% of the deaths occurred in the fourth stage of the disease. Most deaths occurred in the fifth decade of life and were predominantly among males, married individuals, the illiterate, the unemployed, urban residents, and individuals without a history of colorectal cancer in the family.

Conclusion: According to the results obtained, colorectal cancer has a significant mortality rate in Iran, and those who have died from this disease exhibit diverse demographic and clinical characteristic. Paying attention to these statistics and characteristics can aid in managing the epidemic of this disease.

Key words: Colorectal Neoplasms, Epidemiology, Mortality

Introduction

Cancer, after cardiovascular diseases, ranks as the second most common cause of death globally. It is the third most common cause of mortality in Iran., following traffic accidents and cardiovascular diseases (1). About 10% of cancer cases and associated deaths worldwide are caused by colorectal cancer, making it the most prevalent gastrointestinal cancer. The World Health

@2024 Journal of Surgery and Trauma
Tel: +985632381214
Fax: +985632440488
Po Box 97175-379
Email: jsurgery@bums.ac.ir

✉ **Correspondence to:**
Sajjad Amiri Bonyad, Student Research Committee, School of Nursing and Midwifery, Hamadan University of Medical Sciences, Hamadan, Iran;
Telephone Number: +989904639680
Email Address: s.amiribonyad@gmail.com

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Organization (WHO) reports that colorectal cancer caused 935,173 deaths and over 1.9 million new cases worldwide in 2020. It is the second most common cause of cancer-related fatalities globally and the third most common type of cancer (2). Cancer is the second most common cause of mortality in affluent nations and the third most common cause of death in developing nations (3). Colorectal cancer was responsible for almost half of Asia's cancer-related incidence and mortality in 2020 (4). The global incidence of colorectal cancer is on the rise. It is projected that by 2035, approximately 4.2 million new cases will occur, resulting in 1.3 million deaths worldwide (5). The incidence of colorectal cancer in Iran is consistently increasing due to factors such as population growth, changes in lifestyle, higher smoking rates, and decreased levels of physical activity (6). A study by Sofizadeh et al. Between 2011 and 2015 in Golestan Province, colorectal cancer resulted in the loss of 3,283 years of life due to premature mortality. Of these, 1,983 years (60.4%) were attributed to men and 1,299 years (39.6%) to women (7). Colorectal cancer imposes significant healthcare costs on patients and their families. In recent years, preventive measures and palliative care have helped reduce the burden of the disease in high-income countries. However, in middle-income and low-income countries, including Iran, this issue has increased significantly (8). Various factors have contributed to the rapid increase of this disease in recent decades, including environmental factors such as certain eating habits (e.g., increased intake of carbohydrates and fats, low consumption of fibrous foods), lifestyle changes resulting from Western lifestyle, obesity, inactivity, an aging population, and genetics. These are the most important factors influencing the incidence of colorectal cancer (9). The majority of colorectal cancers develop from adenomatous polyps. These polyps are visible protrusions on the mucosal surface and can be pathologically categorized as non-neoplastic hamartomas (pediatric polyps), hyperplastic mucosal proliferations (hyperplastic polyps), or adenomatous polyps. Among these, only adenomatous polyps are regarded as precancerous lesions, with some having the potential to progress into cancer (10). A study conducted in Iran in 2022 estimated that the highest burden of colorectal cancer occurs among individuals aged over 60 (11). Rahimi Pordanjani et al. indicated the highest rates of colorectal cancer are observed in North America, New Zealand, Western Europe, and Japan. Moderate incidence levels are reported in South America, while the lowest rates occur in Africa, South Asia, and Central Asia. In Iran, the incidence rate varies from 2.34 per 100,000 people in Sistan and Baluchestan to 17.62 per 100,000 people in Tehran, and an upward trend in both the incidence and mortality of colorectal cancer have been reported. It is also reported in their study that 13-66% of people with colorectal cancer survive, while this rate is estimated at 47-50% in Iran (9). A study by Pourhoseingholi et al. revealed that colorectal cancer mortality is on the rise in Iran, with higher rates observed in men compared to women (12).

Statistics and results regarding deaths caused by colorectal cancer vary across different studies and regions in Iran and around the world, and these discrepancies can sometimes be contradictory. Additionally, conducting epidemiological research is crucial for identifying the causes of death related to this disease, as well as for prevention and proper management. However, as far as the researchers are aware, no similar study has been conducted in Hamadan, highlighting the necessity of this research.

Methods

This descriptive cross-sectional study investigates the epidemiological causes of death due to colorectal cancer among hospitalized patients in medical-educational centers in Hamadan during 2017-2018. During that period, 200 individuals were admitted to Shahid Beheshti Hospital in Hamadan due to colorectal cancer. The medical records of these patients were reviewed. Initially, all individuals who had died from colorectal cancer during that time were identified, totaling 61 people. Among these, seven individuals were excluded from the study due to incomplete medical records, resulting in the examination of data from 53 patients who died from colorectal cancer. The exclusion criteria encompassed deaths caused by factors other than colorectal cancer and incomplete data in the patients' medical records. Conversely, the inclusion criteria consisted of individuals who had colorectal cancer and were admitted to the oncology department. A researcher-developed checklist was used to gather the information. This checklist included three types of questions on demographic, clinical, and time characteristics. The demographic characteristics included the patient's age, gender, and marital status, education, and occupation. Clinical characteristics included: disabilities caused by colorectal cancer, surgery due to this disease, location of colon involvement, stage of the disease and number of cardiopulmonary resuscitations. The time characteristics included the number of hospital days, the duration of cardiopulmonary resuscitation, and the time of the

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patient's death. The face validity of the checklist content was confirmed by 10 faculty members from Hamadan University of Medical Sciences. After the research plan was approved by the Student Research Committee and ethical approval was granted by the Ethics Committee of Hamadan University of Medical Sciences (code IR.UMSHA.REC. 1397.761), an introductory letter was provided to the hospital management. Necessary permissions were obtained from the security unit and nursing offices of the hospitals involved in the study in Hamadan. The researchers visited the medical records unit to access the archived data, and the necessary information was collected from the files of patients admitted during the study period. The variables under investigation included demographic details such as age, gender, marital status, and education level, occupation, family history of colorectal cancer, place of residence, history of other diseases, site of tumor involvement, disease stage, type of disability caused by the disease, the patient's condition regarding colorectal surgery, number of cardiopulmonary resuscitations, number of days hospitalized, timing of cardiopulmonary resuscitation, and time of death. Data analysis was conducted using descriptive statistics with SPSS software (version 16).

Results

The findings of the present study indicate that the majority of deceased individuals were aged between 61 and 80 years. The study showed that the highest mortality rates from colorectal cancer among patients were observed in men (62.26%), married individuals (92.45%), illiterate patients (58.5%), and the unemployed (49.05%). Additionally, most of the deceased had no family history of colorectal cancer (96.2%), and 69.81% of them resided in urban areas. In the current research, the highest mortality rate was associated with tumor involvement in the ascending colon, with a frequency of 27 cases (51%). Moreover, 61% of the deaths occurred in the fourth stage of the disease (Table 1).

In this study, 53% of the patients had not undergone colorectal surgery. All required cardiopulmonary resuscitation, as none were designated as "Do Not Resuscitate" (DNR) according to the doctor's orders, and 64.15% of them underwent cardiopulmonary resuscitation twice (Table 2).

Table 1: The frequency of mortality due to colorectal cancer based on demographic characteristics

Clinical Characteristics	Frequency	Percent
Age (year)		
21-40	5	9.45
41-60	15	28.30
61-80	22	41.50
81-100	11	20.75
Gender		
Male	33	62.26
Female	20	37.74
Marriage Status		
Single	4	7.55
Married	49	92.45
Level of Education		
Illiterate	31	58.50
Primary education level	5	9.43
Secondary education level	5	9.43
High school diploma	7	13.21
Bachelor's degree or higher	5	9.43
Job		
Employee	9	16.98
Self-employment job	18	33.97
Unemployed	26	49.05

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Table 2: The frequency of mortality due to colorectal cancer based on clinical characteristics

Clinical Characteristics	Frequency	Percent
Type of Disability Due to Disease		
Mental	1	1.90
Chest	10	18.85
Abdominal and pelvis	5	9.43
Upper limb	2	3.77
Lower limbs	1	1.90
Other	9	17
Doesn't have	25	47.15
Colorectal Surgery		
Yes	25	47
No	28	53
Site of Tumor Involvement		
Ascending colon	27	51
Transverse colon	23	44
Descending colon	3	5
Stage of Disease		
Stage 4	32	61
Stage 3	15	29
Stage 2	4	7
Stage 1	2	3
Number of Cardiopulmonary Resuscitations		
Once	6	11.35
Twice	34	64.15
More than twice	13	24.5

Table 3: The frequency of mortality due to colorectal cancer based on time characteristics

Time Characteristics	Frequency	Percent
Number of Hospitalization Days		
1-3	13	24.5
3-6	12	22.64
6-9	7	13.20
9-12	7	13.20
12-14	3	5.70
Above 14	11	20.76
Cardiopulmonary Resuscitation Time		
Morning shift	18	34
Evening shift	13	24.50
Night shift	22	41.50
Time of Death		
8-14	17	32
14-20	9	17
20-2	9	17
2-8	18	34

According to the results of the present study, the highest mortality rate of 24.5% was observed in patients who were hospitalized for 1-3 days, in the night shift (41.5%) and in the period time 2-8 in the morning (34%; Table 3).

Discussion

According to the findings of the present study, the mortality rate of patients with colorectal cancer in medical- educational hospitals in Hamadan during 2017-2018 was 26.5%. In comparison, Downing et al. reported a colorectal cancer mortality rate of 29.1% in the UK between 2006-2008, which is closely aligned with the findings of the present study (13).

A specific study on colorectal cancer mortality in the UK, which employed a similar sampling method to that of the present study, may explain this coherence. The results of the current study indicated that 51% of the patients who died had tumors located in the ascending colon. In this regard, the findings of Washington et al. showed that the majority of individuals with colorectal cancer have tumors in the ascending colon, which is consistent with the results of our study (14). Furthermore, the study by Siegel et al. in 2020

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found tha most colorectal tumors in the United States are located in the ascending and transverse colons of patients (15). According to the researchers, the greater involvement of tumors in the left colon highlights the need for screening and colonoscopy methods to facilitate faster diagnosis, particularly in the early stages. In this study, 61% of deceased patients were in stage 4 of the disease. In this regard, there is a correlation between our findings and those of Johnson et al. and Dianatinasab et al., they reported that 85.7% of their patients were in stages 3 and 4 of colorectal cancer (16,17). According to researchers, in the late stages of colorectal cancer, complications related to the disease, treatment side effects, or surgery can increase patients' vulnerability to death. Additionally, the studies mentioned, similar to the present study, examined colorectal cancer in hospitalized patients over one year, which may contribute to the observed similarities. The findings of the present study indicated that most patients experienced no disability due to cancer. In a study conducted by Lee et al. in 2022 in South Korea, it was found that out of a population of 6,340 individuals with colorectal cancer, only 15.8% reported a disability due to the disease, which aligns with the results of our study (18). This discrepancy may arise from the fact that the present study focused specifically on colorectal cancer, unlike the study by Hewitt et al. Our study showed that 53% of the patients who died did not undergo colorectal surgery. In contrast, the findings of a study by Alves et al. indicated that most patients who died from colorectal cancer had undergone open surgery or laparoscopic colon resection, which contradicts the results of our study (19). It should be noted that the present study focused on mortality in hospitals within a single city, whereas the study by Alves et al. included multiple hospitals. According to the findings of the present study, the highest mortality rate (64.15%) was observed among patients who underwent cardiopulmonary resuscitation more than twice at the time of death. Since no contradictory studies have been found regarding the frequency of deaths related to cardiopulmonary resuscitation based on its necessity, the researchers emphasize that given the sensitivity of medical care in the late stages of cancer, healthcare providers, particularly nurses, should exercise increased caution during the resuscitation process. Additionally, although it was noted that most instances of cardiopulmonary resuscitation occurred during the night shift, no consistent or contradictory studies were found on this aspect. A one-year study of colorectal cancer, similar to the present study, may contribute to the observed alignment. The current research revealed that the majority of deceased patients had no family history of colorectal cancer (96.2%). In this regard, the findings of the study by Aran et al. indicated that only 1.9% of deceased patients had first-degree relatives with colorectal cancer, which is consistent with the results of the present study (20). One reason for the coherence of this study is its specific focus on colorectal cancer in the studied patients. Moreover, Dianatinasab et al. (2016) found that 94.6% of deaths due to colorectal cancer occurred in patients without a family history of the disease, which aligns with the findings of the present study (17). The alignment of findings can be attributed to the proximity of the study population, the number of samples, and the specific focus on colorectal cancer mortality in hospitals within a single city, similar to the present study. Most patients died within the first 1 to 3 days of hospitalization. As no contradictory studies have been found regarding the length of hospital stay, researchers believe that patients admitted in the later stages of the disease tend to have more severe conditions, leading to earlier mortality. Furthermore, among the deceased patients, the highest mortality rate occurred between 2 AM and 8 AM. Since no contradictory studies on the timing of death in colorectal cancer patients have been identified, researchers suggest that the higher number of deaths during these early hours may be related to the reduced medical staff available at night. Upon examining the ages of the deceased patients, it was found that most were in their fifth decade of life. In this regard, the findings of Siegel et al. indicate the highest mortality rates among individuals aged 40-80 years, which aligns with the results of the present study (21). One reason for the consistency of this study is its inclusion of individuals with cancer across all ages. In addition, the findings of a study by Johnson et al. indicated that most deaths from colorectal cancer occur in the fourth decade of life (16). In our study, it was found that 62.26% of the deceased patients were men. In this regard, the findings of Johnson et al. and Aran et al. showed higher rates of colorectal cancer mortality in men, which is consistent with the results of our study (16, 20). One reason for this comparison is the specific focus on colorectal cancer in both sexes over the course of one year. While the prevalence of colorectal cancer is generally similar between men and women, the mortality rate from rectal cancer is higher in men. This highlights the need for more continuous screening and follow-up in this demographic. Based on the findings of the present study, most of

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the deceased patients were married. In this regard, a study by Li et al. revealed that married individuals in stage 4 of the disease experience higher mortality rates compared to single individuals at the same stage, which aligns with our findings (22). One reason for the coherence of this study is its specific focus on colorectal cancer and the frequency of deaths associated with marital status. Researchers believe that the higher mortality rates among married individuals may be linked to factors such as stress, interpersonal conflicts, work-related stress, economic and welfare challenges, dissatisfaction with their spouses, and reduced leisure time. Regarding education level, the findings of the present study indicate that mortality from colorectal cancer is higher among individuals with lower educational attainment. In this context, a study by Dianatinasab et al. in Shiraz found that 44% of individuals who died from colorectal cancer were illiterate, which is consistent with the findings of the present study (17). On the other hand, the findings of the study by Sacerdote et al. in Italy indicated that individuals who died from colorectal cancer were in a favorable condition regarding socio-economic status and education level, which contrasts with the findings of the present study (23).

The reasons for this difference may include variations in the research populations as well as cultural and social differences among the communities studied. Furthermore, the study conducted in Europe, a region with one of the highest rates of colorectal cancer, reflects distinct lifestyle factors. Western lifestyles, characterized by a diet high in red meat and low in fiber intake, sedentary behavior, and other cultural and climatic differences, may significantly influence these disparities. It was also found that most of the deceased patients were unemployed. In this regard, Dianatinasab et al. found that 48.2% of individuals who died from colorectal cancer were unemployed, which is similar to the findings of the present study (17). We believe that one reason for the alignment of findings is the proximity in the number of samples and the similarity of the research communities between this study and others. Notably, 69.81% of the deceased patients were residents of urban areas. In this context, in a study conducted by Sankaranarayanan et al., it was revealed that the chance of survival after colorectal cancer is higher among urban residents compared to rural residents. This is because urban residents typically receive more medical care than their rural counterparts. They also have greater access to screening methods, allowing for earlier diagnosis of the disease. This finding is not consistent with the results of the present study. Researchers suggest that cultural and climatic differences within the research communities, along with variations in sample sizes, may explain this discrepancy.

The present research was conducted exclusively in hospitals and medical - educational centers in Hamadan, and its results may not be generalizable to the entire country or other geographical regions. The study only includes patients hospitalized in medical - educational hospitals, excluding those who visited clinics or private healthcare centers. The financial status of patients and treatment costs, which may play a role in mortality, were not assessed in this study. The study specifically focuses on colorectal cancer and does not include a comparison with mortality trends of other types of cancer.

Conclusions

Given the increasing prevalence of colorectal cancer, along with its associated mortality and complications, raising awareness, utilizing screening methods, and ensuring rapid referral for at-risk individuals are essential steps in preventing the disease and its consequences. Currently, Hamadan lacks specialized centers that address the risk factors associated with colorectal cancer, such as active screening clinics and informational centers for patients. To improve monitoring and evaluation, it is crucial to compile and review statistics from all provinces in the country through national plans from the Ministry of Health. An important aspect that is sometimes overlooked is the need for proper public education through various channels (e.g., social media), about risk factors, symptoms, lifestyle modifications, and the importance of regular screenings for colorectal cancer.

Given that most deaths from colorectal cancer occur after the fifth decade of life, special attention should be focused on married urban men with a family history of the disease, as they are at higher risk. Individuals with these characteristics often have additional risk factors, such as a history of gastrointestinal disease and colon involvement.

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Conflict of Interest

No conflict of interest was reported by the authors.

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