Original Article

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# Trends in the Incidence of Colorectal Cancer and Epidemiologic and Clinical Characteristics of Survivors in Babol City in 2007-2012

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**ABSTRACT**

**BACKGROUND AND OBJECTIVE:** Colorectal cancer is the fourth most common cancer in Iran with a diverse geographic distribution. The purpose of this study was to determine the incidence of colorectal cancer and assess the clinical and epidemiologic characteristics of survivors in the city of Babol, Iran.

**METHODS:** In this cross-sectional study, all new cases of colorectal cancer, recorded by the Cancer Registry Center of Babol, were included for the assessment of the incidence of colorectal cancer during 2007-2012. Clinical and epidemiologic features of patients were investigated via interview in 2013.

**FINDINGS:** A total of 237 patients were registered during the specified period, although only 120 subjects had survived until 2013. Age-standardized rate was 7.7 per 100,000 people in 2007, which increased to 14.6 in 2012. Overall, 54% of subjects were urban residents, 46% were illiterate, 30% were smokers, 16% used hookah, and 10% consumed opium. Family history of colorectal cancer was reported in 27 patients (22.5%). The average age of survivors was 56.74±14.14 years; about a third of patients were younger than 50 years at the time of diagnosis. The mean interval between the presentation of symptoms and diagnosis was 10±13.3 months, and the most common symptoms of the disease included altered bowel habits, rectorhalgia, abdominal pain, constipation, and weight loss, respectively.

**CONCLUSION:** The obtained results showed the increased incidence of colorectal cancer in Babol city. Considering the significant number of young people and the long interval between the onset of symptoms and definitive diagnosis, it is recommended that training courses on the warning signs and screening of colorectal cancer be planned.

**KEY WORDS:** Epidemiology, Incidence, Cancer, Colorectal, Clinical Features.

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## Introduction

Cancer is one of the major causes of death, worldwide. In the coming decades, morbidity and mortality associated with cancer is expected to increase in all world regions. Colorectal cancer is the most common gastrointestinal cancer (2). According to recent statistics, the standardized incidence rates in men and women were 37.7 and 24.3 per 100,000 people in developing countries, respectively. In less developed countries, the corresponding values in men and women were 12.1 and 9.4 per 100,000 population, respectively (3). Colorectal cancer is a major problem in Asian countries (4, 5). The standardized incidence

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rate in many of these countries has increased in the past two decades (6). The standardized incidence rates in men and women were 11.31 and 10.89 in Iran and 12.47 and 12.61 in Mazandaran, respectively; the distribution in two sexes was reported to be almost similar. In total, colorectal cancer is the fourth common cancer (8.4%) in Iran and is ranked the third and fifth most common cancer in women and men, respectively. In Mazandaran, this cancer is the second and fourth most common cancer among women (10%) and men (8.7%), respectively.

Although Iran has a lower incidence of cancer compared to other regions, the age of afflicted patients is less than that reported in Western countries (7, 8). Also, in recent decades, the incidence rate of this cancer has significantly increased (9, 10). In fact, with increased life expectancy, aging, and environmental risk factors, the incidence of colorectal cancer is expected to increase in the coming years. Evaluation of the epidemiology of cancers, with the aim to raise awareness about the associated risk factors and their prevalence, is the basic principle for overcoming these diseases. It also provides access to age, gender, ethnic, and economic patterns in one region, leading to the identification of specific target groups. No population based study has comprehensively evaluated the epidemiologic and clinical features of colorectal cancer in survivors. The majority of performed studies were hospital-based, and the patients were not representatives of the evaluated population. However, in the current research, the study population consisted of patients with colorectal cancer, whose medical records were registered in the Cancer Registry Center of Babol city.

Cancer registration in Iran was first performed in 1967 in Mazandaran province by Babol Research Station and has been implemented throughout the country since 1986, following the mandatory act of cancer registration in the country. The cancer registry system in Babol is population-based. The number of cancer patients was 7,019 in Babol city during 2003-2012, among whom 642 cases (9.1%) were colorectal cancer. During these 10 years, this form of cancer has shifted between the third and seventh rank in the region and is currently the fourth and third most common cancer in men and women, respectively. Colorectal cancer is one of the few preventable types of cancer. By the establishment of a counseling and screening center in Babol, it was possible to raise knowledge about this condition and identify patients' diferent characteristics and clinical features in order to combat this disease. In fact, by implementing preventive and screening programs, we can inhibit the progress of this disease in our community. Moreover, through evaluating the status of survivors and recognizing their medical needs, we can design appropriate interventions to improve their status. Therefore, the purpose of this study was to determine the incidence of colorectal cancer and its clinical and epidemiologic feaures in cancer survivors in 2007-2012.

## Methods

In this cross-sectional study, after receiving permission from the Ethics Committee of Babol University of Medical Sciences, the incidence of colorectal cancer was determined by evaluating available cases at Cancer Registry Center of Babol, using census sampling during a 6-year period (2007-2012). This study was conducted in two stages. In the first stage, based on the pathologic information (using ICD-0 code), demographic characteristics and tumor information including topography code (ICD-0-C) and pathology code (ICD-0-M) were collected. Subjects with C18 (colon), C19 (rectosigmoid junction), C20 (rectum), and C21 (anus and anal canal) codes were included in the study (n=269).

Thirty-two patients no longer resided in Babol and had provided their relatives' addresses after visiting the pathology centers of Babol. Therefore, the crude incidence rate and age-standardized rate (ASR) were detemined for the remaining 237 patients. To calculate the crude incidence rate, the population of the city, estimated by the health center of Babol, was used (according to age groups). To calculate ASR, world standard population (per 100,000 people), reported by the International Agency for Research on Cancer (IARC) in 2012, was used by applying direct methods (3). In order to evaluate the clinical and epidemiologic features of the disease, cancer survivors were evaluated in the specified years. The inclusion criteria were as follows: 1) having the listed codes; 2) being alive; 3) currently residing in the city of Babol; and 4) diagnosis during the specified periods. Lack of cooperation and incorrect address or phone number were the exclusion criteria. Of 237 patients, 101 cases (96 deaths and 5 cases of immigration) were excluded

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from the study. Of 136 remaining patients, 3 patients were non-cooperative; also, phone and home addresses of 13 patients were incorrect, based on the pathologic information. The questionnaires were completed for all the remaining 120 patients and the pathological data were collected. Participation rate in this study was estimated at 88%.

The demographic questionnaire included patient's age, sex, place of residence, marital status, health insurance coverage, risk factors, family history of diseases, the interval between the presentation of symptoms and diagnosis, the most common symptoms at admission, and the anatomic location of the tumor; these data were gathered via one-hour interviews. Written informed consents were obtained from the head of the family and family members, and ethical considerations were taken into account. The objectives of the study were explained to the participants by two experienced and trained interviewers. At the end of the interview, the required counseling was provided for the patients. For data analysis, SPSS version 16 was used. For quantitative variables, mean and standard deviation were calculated in case the data were normally distributed.

If the data were not normally distributed, median and interquartile range were measured. For qualitative variables, frequency and percentage were calculated. To compare the mean values of two independent groups, independent t-test was applied, considering the normal distribution of data (based on mean, standard deviation, and Kolmogorov-Smirnov results). Mann-Whitney was performed in case the data were not normally distributed. For comparison of qualitative variables, Chi-square test was used. Cochran-Armitage Trend test was applied during 6 years. For ASR calculation, Stata 11 software was used, and $p<0.05$ was considered statistically significant.

## Results

In years 2007-2012, 237 cases of colorectal cancer were registereed in the Cancer Registry of Babol. In total, 134 (56.5%) patients were male with an average age of 58.25±14.47 years and the rest were female with the mean age of 58.84±14.21 years. Male-to-female ratio was 1.3 and no significant difference was observed between the sexes in terms of age. The patients' age at diagnosis was<50 years in 30% of patients (age range: 18-89 years) and most cases were in the sixth decade of life (fig 1). ASR of colorectal cancer was 7.7 per 100,000 people in 2007 (95% CI=5.1-10.3), which increased to 14.6 in 2012 (95% CI=310.9-18.3) (fig 2). Test results confirmed the increase in the number of cases with colorectal cancer in the city of Babol ($p<0.001$).

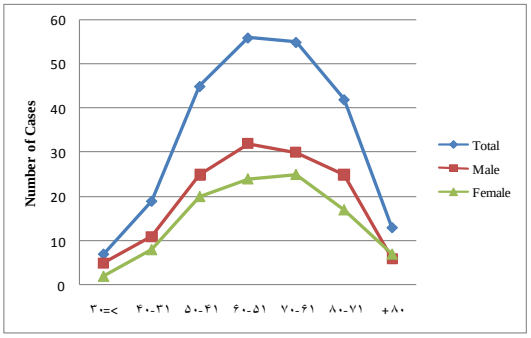


**Figure 1. Graph of age in patients with colorectal cancer detected in 2007-2012 in Babol**

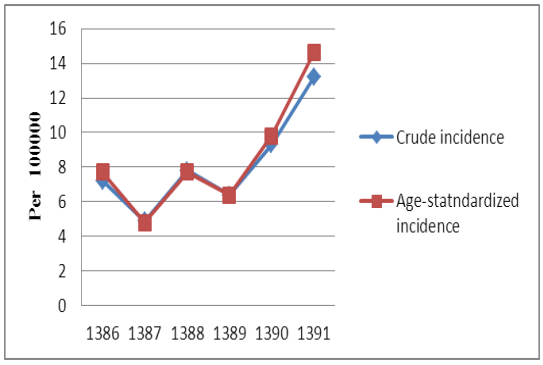


**Figure 2. Crude incidence rate and ASR of colorectal cancer in 2007-2012 in Babol**

The analysis of colorectal cancer survivors in the mentioned years showed that of 120 survivors participating in this study, 75 cases (62.5%) were male and the rest were female. The average age of men and women was 56.49±15.15 and 57.16±12.42 years, respectively. No significant difference was observed between the sexes in terms of the age of disease onset. Male-to-female ratio was 1.7 and patients' age at the time of cancer diagnosis was less than 50 years in one third of patients. Also, the results showed that 54.2% of subjects were urban residents, 85% were married, 46.7% were illiterate, 55% were covered by complementary insurance for treatment costs, and 31.7% had changed their occupations and income sources after the disease (table 1). In total, 51 cases (42.5%) had a prior history of digestive problems. The most common clinical symptoms at admission were

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changes in bowel habits and blood discharge during defecation. Also, the tumor was anatomically located in the colon in almost two-thirds of cases (table 2)

**Table 1. Demographic characteristics of patients with colorectal cancer in 2007-2012 in Babol (n=120)**

| Variables | Groups | N(%) |
|---|---|---|
| Gender | Male | 75(62.5) |
| | Female | 45(37.5) |
| Place of residence | City | 65(54.2) |
| | Village | 55(45.5) |
| Marital status | Married | 102(85) |
| | Other (single, widowed, or divorced) | 18(15) |
| Age | >50 years | 36(30) |
| | ≤50 years | 84(70) |
| Health insurance | Health care services | 26(21.7) |
| | Tamin Ejtemaei | 47(39.2) |
| | Rural insurance | 29(24.1) |
| | Other | 18(15) |
| Educational level | Illiterate | 56(46.6) |
| | Primary education | 17(14.2) |
| | Junior high and high school | 32(26.7) |
| | University | 15(12.5) |
| Occupation before the disease | Employee | 18(15) |
| | Worker | 14(11.7) |
| | Self-employed | 32(26.7) |
| | Farmer or rancher | 25(20.8) |
| | Housewife | 31(25.8) |

**Table 2. Clinical characteristics of patients with colorectal cancer in 2007-2012 in Babol (n=120)**

| Variables | | N(%) | Divided by sex N(%) | |
|---|---|---|---|---|
| | | | Male | Female |
| The most common symptoms at admission (more than one symptom is possible) | Change in bowel habits | 92(76.7) | 58(77.3) | 34(75.6) |
| | Blood discharge during defecation | 83(69.2) | 56(74.7) | 27(60) |
| | Abdominal pain and vomiting | 78(65) | 44(58.7) | 34(75.6) |
| | Constipation | 70(58.3) | 39(52) | 31(68.9) |
| | Weight loss | 60(50) | 40(53.3) | 20(44.4) |
| Anatomic location of the tumor | Colon | 81(67.5) | 51(68) | 30(66.7) |
| | Rectum | 39(32.5) | 24(32) | 15(33.3) |

Family history of cancer (60%) was reported in 72 patients, at least in one of the first-degree (parents, children, or siblings) or second-degree (grandfather, grandmother, aunt, or uncle) relatives. Also, 27 patients (22.5%) had a family history of colorectal cancer. No significant difference was observed between the sexes in terms of family history of colorectal cancer. Moreover, in terms of risk factors, smoking was reported in about 30% of subjects, hookah in 16%, and opium use in 10% (table 3).

**Table 3. Risk factors and family history of cancer in relatives of patients with colorectal cancer in years 2007-2012 in Babol (n=120)**

| Variables | | N(%) | Sex division N(%) | |
|---|---|---|---|---|
| | | | Male | Female |
| Family history of cancer | Yes | 72(60) | 45(60) | 27(60) |
| | No | 48(40) | 30(40) | 18(40) |
| Family history of colorectal Cancer | Yes | 22(22.5) | 16(21.3) | 11(24.4) |
| | No | 93(77.5) | 59(78.7) | 34(75.6) |
| | First-degree relatives | 13(48.1) | 8(50) | 5(45.5) |
| | Second-degree relatives | 12(44.5) | 6(37.5) | 6(54.5) |
| | Both | 2(7.4) | 2(12.5) | 0 |
| | At least one | 24(88.9) | 13(81.3) | 11(100) |
| | Two and more | 3(11.1) | 3(18.7) | 0 |
| Family history of other cancers | Yes | 64(53.3) | 40(53.3) | 24(53.3) |
| | No | 56(46.7) | 35(46.7) | 21(46.7) |
| | First-degree relatives | 35(54.7) | 18(45) | 17(70.8) |
| | Second-degree relatives | 17(26.6) | 12(30) | 5(20.8) |
| | Both | 12(18.7) | 10(25) | 2(8.4) |
| Risk factors History of Consumption | Cigarette smoking | 34(28.3) | 34(45.3) | 0 |
| | Hookah | 19(15.8) | 17(22.7) | 2(4.4) |
| | Opium | 13(10.8) | 9(12) | 4(8.9) |
| | Alcoholic drinks | 17(14.2) | 17(22.7) | 0 |

The mean interval between the presentation of symptoms and diagnosis, based on pathological data, was 10±13.3 months; also, the median (interquartile range) was 6 months (6-12). No significant difference

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was observed between the sexes in terms of the interval between the onset of symptoms and diagnosis. The time interval was less than a month in 18 pateints (15%) and more than 1 year in 23 patients (19.2%). In total, 119 patients (99.2%) were aware of their disease considering their symptoms and referral to a physician. However, one patient (0.18%) had presented with no symptoms and had been diagnosed with anemia in voluntary tests; she had found out about her disease in her following visits to physicians.

Based on the results, 81 patients (67.5%) had at least one concomitant disease along with colorectal cancer and 39 patients had no other diseases except colorectal cancer. In total, 58.7% of men were diagnosed with a disease other than colorectal cancer, while 82.2% had concomitant diseases. Among comorbidities, the most frequent deseases were chronic back pain in 32 patients (26.7%), cardiovascular diseases in 26 cases (21.7%), high blood pressure in 21 cases (17.5%), psychological problems in 20 cases (15.7%), other forms of cancer in 18 patients (15%), and diabetes in 13 patients (10.8%), respectively. There was no significant difference between the sexes in terms of comorbidities (p=0.008). Also, among patients, surgery was the first treatment in the majority of patients (80%).

## Discussion

The results showed that the standardized incidence rate of colorectal cancer has increased in Babol during 2007-2012. This rate was at its lowest in 2007 (4.8 per 100,000 people) and at its highest in 2012 (14.6 per 100,000 people). According to a report in 2009 by the Office of Cancer affiliated to Disease Management Center, ASR of cancer was 10.88 in 100,000 people in Iran and 12.56 in 100,000 people in Mazandaran. According to IARC Globocan 2008, standardized incidence rates were 37.7 men and 24.3 (in 100000 people) women in developed countries and 12.1 men and 9.4 women in less developed countries (3). Discrepancies have been found regarding the incidence of colorectal cancer in our country in different geographic locations.

Of all provinces, Sistan and Baluchestan (2.54 in 100,000 people) and Hormozgan (2.62 in 100,000 people) had the lowest incidence rates in men. On the other hand, Gilan (17.22 in 100,000 people), Tehran (16.46 in 100,000 people) and Semnan (16.13 in 100,000 people) had the highest prevalence rates, which is probably related to different risk factors. Also in women, north Khorasan province ( 2.34 in 100000 people), Sistan and Baluchestan(3.04 in 100000 people) and Kohgiloyeh and Boeirahmad province (3.11 in 100000 people) had the lowest incidence rates and Tehran ( 17.62 in 100000 people) and Semnan (17.43 in 100000 people) had the highest incidence rates. This increasing trend in Babol may be related to the elevated annual incidence of cancer (due to increased life expectancy and number of elderly), better reporting of cancer cases (given the altered approach toward reporting), increased training and awareness of people by health care workers, or better screening and diagnosis.

It can be also related to differences in life habits and inclinations toward Western lifestyles (i.e., high-fat low-fiber diets and physical inactivity). Of a total of 237 cases registered by the Cancer Registry Center of Babol, 134 cases (56.5%) were male, and male-to-female ratio was 1:3. In terms of gender distribution in a study by Karimi Zarchi et al. in Tehran, this ratio was reported as 1:8 (12). Also, in a study by Hajian et al. in 2001, which determined the age pattern of cancer patients in Babol, of 632 recorded cases, 366 (57.0%) and 266 (42.1%) subjects were male and female, respectively (13). In most studies, the patients were men (14,15), although in a number of studies, men and women were almost equal in number (10). The difference in the incidence of colorectal cancer in both sexes in various areas is affected by several factors. It seems that men are more exposed to risk factors associated with cancer. The average age of patients was 56.7 years, which is lower than that reported in Western countries (16).

The majority of cases were in the sixth decade of life and 30% of patients were younger than 50 years. In Western countries, the average age of women and men was 62 and 63 years, respectively, and the majority of cases were reproted in the seventh decade of life (16). The findings of this study were consistent with previously conducted research, showing the younger age of patients at the onset of the disease. In studies by Karimi Zarchi et al. in Tehran (12), Sarmast-Shooshtari et al. in Ahvaz (17), and Semnani et al. in Gorgan (18), 28%, 48%, and 36% of subjects were younger than 50 years, respectively. It seems that the earlier onset of the disease is caused by genetic factors, lifestyle changes, and the young age of the

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community. Thus, these data emphasize the importance of warning signs and screening at young age. In colorectal cancer survivors, change in bowl habits was the first symptom, followed by rectorrhagia, abdominal pain, constipation, and weight loss in most cases. In studies performed by Fakheri et al. in Sari (19), Fateh et al. in Arak (14), Salari et al. in Yazd (20), and Sarmast-Shooshtari et al. in Ahvaz (17), rectorrhagia was noted as the first symptom of the disease.

Also, in the study by Semnani et al. in Gorgan (18), abdominal pain and constipation were the first symptoms; in all the above-mentioned studies, these five factors were the major symptoms. In this study, 42.5% of subjects had a prior history of gastrointestinal diseases years before the onset of symptoms; therefore, more attention should be paid to these symptoms. Upon seeing these symptoms, healthcare workers should take the necessary steps in order to examine colorectal cancer, even at young age, since this condition does not have any symptoms in the early stages and some of these symptoms are non-specific. Therefore, the diagnosis of disease before the manifestation of symptoms by performing screening and treatment programs would be much more effective than diagnosis after the prensentation of clinical symptoms.

In this study, 99.2% of patients were diagnosed after the onset of symptoms, and the average interval between the onset of symptoms and diagnosis was 10 months. In the study by Semnani et al. (18) in Gorgan, the average interval was more than 6 months, which was consistent with the current findings. However, in a study by Derakhshandfar et al. in Hamadan (21), the interval was 4 months. Also, in many other studies such as those performed by Potter et al. and Goldman et al. (22, 23), the average interval was less than 6 months. The long time interval in our study can be related to the lack of awareness about the warning signs of colorectal cancer and delayed diagnosis by physicians. A patient with delayed diagnosis is usually at the advanced stage of the disease, which results in difficult treatment and shorter survival time (24). Evidence suggests that regular screening for colorectal cancer is effective in reducing the incidence and mortality of colorectal cancer (25, 26).

Therefore, more attention should be paid to the screening of risky populations. In this study, 60% and 22.5% of patients had a prior history of cancer and colorectal cancer in their next of kin, respectively. These results are consistent with studies performed in Western countries (25%) (27) and the research conducted in Sari (prior history of colorectal cancer in 24% of subjects) (19); these values confirm the need for the screening of patients' relatives in Mazandaran province.

Contrary to the mentioned research, the history of colorectal cancer in relatives was reported in 16.7% (18), 15.5% (28), and 4.3% of subjects in a previous study (29). These differences may be due to social and cultural factors such as consanguineous marriages in some areas. Also, in this study and other conducted research, family history of cancer was inquired from patients. Therefore, the obtained information may be inaccurate due to patients' lack of information about the risk or type of cancer in their relatives. Therefore, we suggetst that this point be taken into account in future studies.

In terms of risk factors, smoking history was reported in 28.3% of patients. Similar values have been obtained in other studies. For instance, in a study by Serakhshanfar et al., smoking history was reported in 30.5% of patients (21). Also, in a study by Karimi Zarchi et al. in Tehran, 22.4% of subjects smoked cigarettes (12). Since smoking is a risk factor for colorectal cancer (30), its prevention and cessation should be encouraged in consultation sessions.

In this study, the incidence of colorectal cancer and its epidemiologic and clinical features were evaluated in colorectal cancer survivors over a specified period of time. The obtained fidnings can help describe the current status of survivors and determine their health and clinical needs. Access to almost 90% of survivors is the strength of this study. One of the limitations of this study was non-uniformity and non-recording of patients' information in pathology sheets. Also, the questions were answered by the pateints themselves, which might have resulted in the inaccuracy of the data.

In addition, the epidemiologic and clinical features were only related to survivors and the results cannot be generalized to all patients, since deseased patients might have had different clinical and epidemiologic characteristics. The present research by describing the current status of cancer survivors can pave the way for future studies. Therefore, we can perform interventions to improve the quality of life of cancer survivors and propose strategies for preventing and combating this

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condition. According to the obtained results, the incidence rate of colorectal cancer is rising in Babol. Also, the number of young people was high and the interval between the onset of symptoms and definitive diagnosis was long. Since colorectal cancer is a preventable type of cancer, plans for eliminating the associated risk factors and training about healthy lifestyles and warning signs of colorectal cancer are of high significance.

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