



Original research

Colorectal cancer in southern Israel: Comparison between Bedouin Arab and Jewish patients

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HIGHLIGHTS

- This is a first comparison of CRC in different population in Southern Israel.
- Presenting sign of rectal bleeding is more frequent among Bedouin Arabs.
- CRC in Bedouin Arabs is characterized by a higher female rate, younger age, and higher rates of distal location compared to Jewish patients.

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ABSTRACT

Purpose: Colorectal cancer (CRC) is the second most common malignancy and the third leading cause of cancer deaths in Israel; it is less common among the Arab than the Jewish population. This study compares the clinico-pathologic features, treatment, and prognosis between Bedouin-Arab (BA) and Jewish CRC patients treated at our medical centre.

Methods: The medical records of 56 BA patients with CRC were compared retrospectively to 115 Jewish patients. Collected data included age, gender, history of smoking, family history of cancer, presenting symptoms, laboratory tests, previous malignancy, tumor characteristics, surgery type, stoma formation and closure, types of adjuvant treatment, and outcome.

Results: BA patients were younger (mean age 68 versus 57 years, $p < 0.001$), showed a higher incidence in females ($p = 0.045$), and had a lower frequency of a family history of cancer ($p = 0.005$) compared to Jewish patients. BA patients had a higher presentation of rectal bleeding and a lower rate of anemia at tumor diagnosis ($p = 0.05$ and $p = 0.004$, respectively) with a more distal location of the tumor ($p = 0.003$). BA patients more often received chemotherapy and radiotherapy ($p = 0.02$ and $p = 0.04$, respectively). Disease-free survival was shorter among BA patients ($p = 0.023$); overall survival was similar in both groups.

Conclusions: CRC in BAs is characterized by a higher proportion of female, younger age, and higher proportion of distal location compared to Jewish patients. These differences in biology may be related to differences in past lifestyles and diet of BA compared to Jewish patients, and are expected to decrease in the following years as the BA population continues to undergo “westernization” changes.

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1. Introduction

Colorectal cancer (CRC) is the third most common cancer in men and the second in women worldwide. CRC is the third most common cause of cancer death in Israel and is one of the most common cancers in Western countries. Sixty percent of the cancer occurs in

developed countries. Incidence rates are substantially higher in men than in women (overall sex ratio of the ASRs 1.4:1) [1].

CRC incidence depends on the ethnicity of the patient. According to data from the Israel National Cancer Registry, there is a lower incidence of CRC in the Arab than in the Jewish population in all age groups. Based on data from 2012, the age standardized rate (per 100,000) of colon cancer in the Arab male and female population was 18.99 and 15.6 compared to 22.89 and 17.74 in the Jewish population. The corresponding rates for rectal cancer were 7.06 and 6.93 among Arab population and 10.66 and 7.31 among the Jewish

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population [2].

The development of CRC is directly related to both hereditary and environmental factors. Jews and Arabs live in the same geographical area and therefore are affected by similar ecological and environmental factors. However, these two groups differ in socio-economic status, and cultural, dietary, and genetic characteristics. Most Israeli Arabs live in a rural area, and engage in physical work and farming. The Jewish population is heterogeneous, and includes those of European and Sephardic Jews and Jews born in Israel.

Given the complex etiology of CRC, the importance of genetic, socio-economic, and nutritional factors in development of CRC on the one hand, and the special features of the Bedouin population in southern Israel (Negev area) on the other hand, including high rates of consanguinity, high incidence of hereditary syndromes, transition to permanent settlement, and a change in life habits, we decided to conduct the present study. The purpose of this study was to compare clinical manifestations, incidence, treatment, and prognosis in Bedouin Arab (BA) and Jewish patients with CRC treated at our Medical Center.

1.1. Patients and methods

This retrospective study was designed to compare BA and Jewish CRC patients. All the patients were newly diagnosed and treated for CRC in the Surgery and Oncology departments at our Medical Center. Our hospital is the largest medical center, and the only institute that provides comprehensive primary and tertiary oncological care for cancer patients in the Negev. BAs comprise approximately 20% of the total one million population residing in the Negev. The BA patients were diagnosed between January 1997 and September 2013. All the Jewish patients were diagnosed in the middle period of the study, in 2008. Fecal occult blood test represent a main screening test for CRC in Israel during study period. The implementation rate of early detection tests for colorectal cancer in Israel is still relatively low: only half the target population undergoes the fecal occult blood test in 2012.

The study was approved by the Ethics Committee of our institution. The list of patients was pooled from the computerized data of the Department of Oncology. Demographic information included age, sex, smoking history, and family history of endometrial, gastrointestinal, or urinary cancer. Disease information consisted of presenting symptoms, laboratory tests before the surgery or at diagnosis, previous diagnosis of another primary cancer, primary tumor size (T), the rate of involvement of lymph nodes (N), the existence of distal metastases at diagnosis (M), stage of disease (according to the Classification of the AJCC, 7th Edition), the degree of differentiation, and the histological type of the tumor. All patients with CRC were treated and followed similarly according to accepted protocols in Israel. The treatment data included the urgency and type of surgery, whether there was a stoma formation and closure, the type of adjuvant treatment (radiation and/or chemotherapy), tumor recurrence and recurrence site (local or systemic), and outcome including disease-free (DFS) and overall survival (OS).

1.2. Statistical analysis

The data were coded and stored using a Microsoft Office Excel program, and analyzed with SPSS 21.0 (SPSS, Chicago, IL). Analysis of variables was performed using Fisher's exact test, Mann-Whitney test, Pearson's Chi-square, and Student *t*-test. The link between discrete variables was determined using Pearson's Chi-square test. Comparison of the mean values of independent groups was performed using the Student *t*-test. The link between

ordinal variables was determined by Mann-Whitney test. Survival rates were determined using the Cox model. Only *p* values equal to or lower than 0.05 were considered statistically significant.

2. Results

The study included 171 patients with the diagnosis of CRC: 56 BA and 115 Jewish patients. The distribution of BA patients according to the year of diagnosis is shown in Fig. 1; the peak of CRC diagnosis was observed in 2012 (9 patients).

Demographic parameters comparing BA and Jewish patients are shown in Table 1. The average age of BA patients was younger by 11 years than the Jewish patients (57.3 years versus 68.6 years, $p < 0.001$). There was an equal distribution of men and women (50%) in the study. However, the BA population was represented mainly by women. There was no significant difference in the rate of smokers between the two groups. A family history of endometrial, gastrointestinal, or urinary cancer was more common among the Jewish population than in the AB population.

Comparison of disease characteristics is displayed in Table 1. The Jewish population had more anemia at presentation than BAs (20% versus 4%, $p = 0.004$). On the other hand, there was a greater tendency to rectal bleeding during diagnosis in BAs compared to the Jewish group (36% versus 22%, $p = 0.056$). There was no difference between the groups in hemoglobin and CEA levels at time of CRC diagnosis. Occurrence of another primary cancer additional to CRC was similar in both groups (4% in BA compared with 6% among the Jews, $p = 0.72$). Significant difference was found between the two populations in the location of CRC ($p = 0.008$). Rectal cancer was more frequent in BA patients (45% versus 22%), while in Jews, CRC appears more commonly in the right colon (38% versus 18%). There was no difference in tumor size, lymph node involvement, distal metastases, and the stage of CRC between the two groups. Cancer differentiation and histological type of the tumor were similar in both groups. Comparison of colon and rectal cancer between two groups doesn't find differences despite patients age and higher incidence of family history of colon cancer in Jewish patients (Table 2).

Table 3 illustrates the treatment characteristics of the patients. About 90% of patients in each group underwent surgical removal of the tumor. There is no statistically significant difference between the groups regarding the urgency of the surgery, type of surgery, and stoma formation during the surgery; BA patients had more chemotherapeutic treatments than Jewish patients (68% versus 49%, $p = 0.02$). Comparison between both groups according to the stage of the disease found that BA patients had more chemotherapy than Jewish patients in stage 2 (50% versus 24%, $p = 0.025$), and BAs had more radiation therapy than Jewish patients (36% versus 21%, $p = 0.04$). However, this treatment modality was similar in both groups according to tumor location.

Table 3 illustrates the differences in outcome characteristics between the two populations. The recurrence of CRC was higher in BA than in Jewish patients, but the difference was not significant (21% versus 10%, $p = 0.065$). There was no difference in recurrence rate comparing tumor stage and localization. OS was similar in two groups in view of gender and tumor staging. Comparison of BA and Jewish patients' Kaplan-Meier curves of OS and DFS are presented on Figs. 2 and 3, respectively.

Logistic regression of OS of BA and Jewish patients' unadjusted and adjusted for age, stage and tumor location reflex significant impact of age ($p = 0.031$, ExB 1.03, CI 1.003–1.06) and tumor stage IV ($p < 0.01$, ExB 85, CI 11–636) on survival, without difference between BA and Jewish patients (Table 4). Logistic regression analysis of DFS of BA and Jewish patients' does not show any significant risk factor (Table 5).

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