

Incidence and Trends of Gastrointestinal Malignancies in Jewish and Arab Populations in Israel over 32 Years

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ABSTRACT: **Background:** Gastrointestinal malignancies comprise a broad spectrum of neoplasms and have a high overall incidence. The incidence rates in Israel vary among ethnic groups due to different risk factors.

Objectives: To investigate incidence trends of these cancers in Israel in both Jewish and Arab ethnic groups in order to better understand the risks in those groups.

Methods: This study is based on data published by the Israel National Cancer Registry and the Central Bureau of Statistics. We compared statistics between ethnicities and genders. We examined the eight most common gastrointestinal cancers, focusing on colon, rectal and gastric cancers.

Results: Between 1980 and 2012 there was a decline in the incidence of gastric cancer in the Jewish population; in contrast, a significant increase occurred in Arab women, but there was no significant change in Arab men. Colon cancer showed a relative decrease in incidence in the Jewish population, but an increase in the Arab population. A decrease in the incidence of rectal cancer in the Jewish population and an increase in the Arab population was observed.

Conclusions: Gastric, colon and rectal cancers exhibit differences in incidence and outcome between Jewish and Arab populations in Israel. These differences were not observed in the other five types of less common gastrointestinal cancers.

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KEY WORDS: ethnicity, gastrointestinal cancers, colorectal cancer, rectal cancer

The global burden of cancer continues to increase largely as a result of the aging of the world population [1-5]. Of all cancers, malignancies of the gastrointestinal (GI) tract occupy an important place in terms of their broad spectrum and overall incidence [6]. While incidence and mortality rates for most cancers (including lung, colorectal, female breast, and prostate) are decreasing in the United States and other Western countries [7], they are increasing in a number of less developed and economically transitioning countries [8,9], perhaps as a result of unhealthy Western lifestyles that include smoking, physical inactivity, and consumption of calorie-dense foods

[10]. Therefore, cancer incidence and time trend monitoring are essential for cancer research and health care planning.

In 2013 we reported on the incidence trends and mortality rates of gastric cancer in Israel. We were surprised to find specific differences in the trends between the Jewish and Arab populations [11]. In this article we report on the incidence trends and mortality of different types of GI malignancies in these two main ethnic groups in Israel.

PATIENTS AND METHODS

As of 2012, the overall population of Israel was 8.1 million, of which 75.3% were Jewish and 20.5% Arab.

ASCERTAINMENT OF CANCER DIAGNOSIS

The Israel National Cancer Registry (INCR) was established in 1960 as a national population-based and passive registry that collects information on all borderline, in situ, and invasive tumors diagnosed in Israel, as well as on benign tumors of the brain and the central nervous system. Since 1982, reporting to the INCR has been mandatory. The data collected include demographics (gender, date of birth, country of birth, date of immigration to Israel, and date of death), as well as data on the tumor site, histology, stage, and surgical treatment at diagnosis. The completeness of the collected data is examined periodically and was found to be over 93% for solid tumors [12].

Data were evaluated for Israeli Jews (male and female) and Israeli Arabs (male and female) regarding GI malignancies: gastric, colon, rectal, small bowel, esophagus, liver, gallbladder, and pancreatic cancers. Incidence and trends were studied for all eight different types of GI cancers.

DATA ANALYSIS

Jewish and Arab groups were compared with respect to specific type of GI malignancy incidence, age-adjusted to the world standard population for the years 1980–2012. It should be mentioned that until 1995 the Arab population group included a smaller minority defined as "Others" (i.e., non-Arab Christians and others listing no religious affiliation) who comprised about 4.5% of the total Israeli population. Only since 1996 have rates (and denominators) been available exclusively for Arabs.

We examined the statistical significance of the time trends in each population group by applying a linear regression model, where calendar year served as the independent variable and the corresponding annual rate was the dependent variable, followed by computing the *P* value of the resulting regression coefficient (i.e., testing the hypothesis that the slope is significantly different from 0). Applying this model enabled us to compute the differences in the time trends between population groups, where the calendar year served as the independent variable and the difference between the corresponding annual rates of the two groups served as the dependent variable. We then computed the *P* value of the regression coefficient. The alpha level was set as 0.05 for all analyses, and all tests were two-sided. All analyses were performed using IBM SPSS Statistics, Version 18.00 for Windows (IPSS Inc., Chicago, IL, USA).

RESULTS

Around 300,000 oncology patients currently live in Israel, and each year about 26,000 new patients are diagnosed with invasive tumors. The most common cancer types are: breast (females), large bowel (both genders), prostate (males), and lung (more common in males, especially Arab males). The incidence of different types of gastrointestinal malignancies and their distribution in the two population groups and gender were evaluated between the years 1980 and 2012. Since the incidence of the other types of gastrointestinal cancers was significantly lower than in the three leading types (colon, gastric, rectal), we will primarily discuss these three in relation to the other five types.

COLON CANCER

During the year 2012, 2208 new patients were diagnosed with colon cancer. From 1980 through 2012, the age-adjusted incidence rates (per 100,000) decreased from 33.9 to 33.6 cases among Jewish men (-0%, *P* > 0.05) and 28.5 and 25.0 cases per 100,000 among Jewish women (-0.11%, *P* < 0.05). However, in Arab groups, the rates increased in men from 7.9 in 1980 to 26.0 cases (per 100,000) in 2012 (+229%, *P* < 0.005). The corresponding rates in women were 6.1 and 22.1 cases per 100,000, respectively (+262%, *P* < 0.05). These data are shown in Table 1 and Figure 1.

GASTRIC CANCER

Approximately 650 new cases of gastric cancer (GC) are diagnosed in Israel every year. Between 1980 and 2012, most patients were diagnosed at age ≥ 65 among Jews and at age ≥ 55 among Arabs. In the same period, age-adjusted GC incidence rates (per 100,000) decreased from 16.8 to 8.80 cases (-47.8%, *P* < 0.0001) and from 8.95 to 4.12 cases per 100,000 (-67.5%, *P* < 0.0001) among Jewish men and women, respectively. Among Arab males, the rates were considerably stable, 9.78 per 100,000 in 1980 and 9.37 cases per 100,000 in 2012 (*P* = 0.1513). Among

Table 1. Incidence and trends in gastrointestinal malignancies (age-adjusted incidence rates per 100,000)

	Jews				Arabs			
	Male		Female		Male		Female	
	1980	2012	1980	2012	1980	2012	1980	2012
Colon cancer	33.9	33.6	28.5	25.1	7.9	26*	6.1	22.1*
Gastric cancer	16.8	8.80*	8.95	4.12*	9.78	9.37	4.74	5.35*
Rectal cancer	16.5	10.6*	12.7	7.3*	2.2	7.1*	2.6	6.9*
Pancreatic cancer	8.4	8.5	7.5	6.5	2.6	5.7	4.6	4.3
Liver cancer	3.3	2.9	1.4	1.4	1.2	3.2	0.6	1.1
Gallbladder cancer	1.2	1.6	2.8	1.5	3.8	2.6	2.7	2.9
Esophageal cancer	1.8	1.4	1.3	0.8	1.0	0.7	0.2	0.2
Small bowel cancer	0.5	0.9	0.7	0.8	0.38	0.48	0.68	0.96

*Statistically significant differences

Figure 1. Incidence and trends in colon cancer

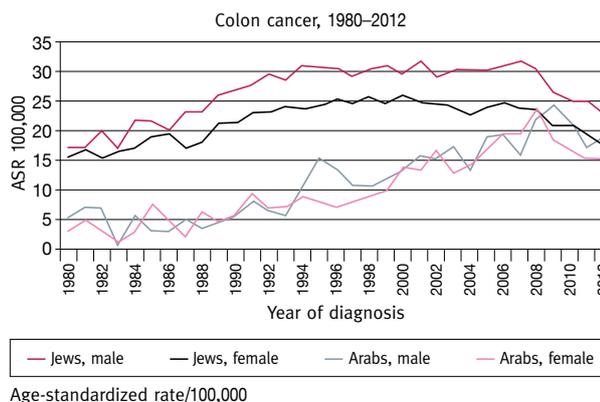
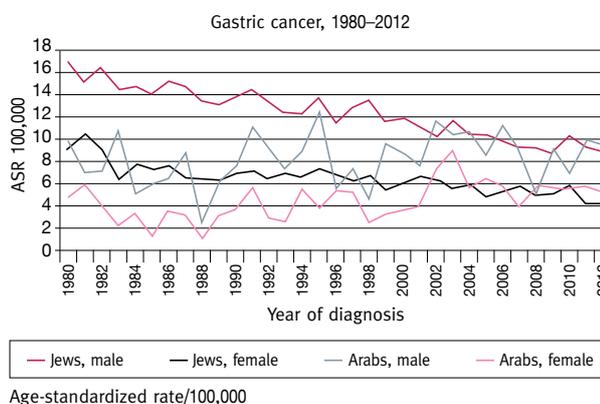
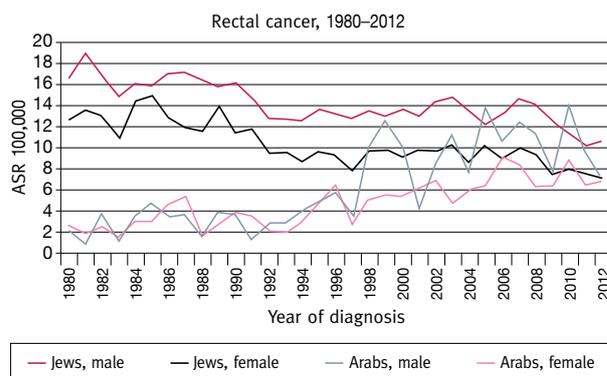


Figure 2. Incidence and trends in gastric cancer



Arab women, the rates increased significantly, from 4.74 per 100,000 in 1980 to 5.35 in 2012 (12.9%, *P* = 0.0019). The time trend differences between Jewish and Arab men (*P* < 0.0001)

Figure 3. Incidence and trends in rectal cancer

and Jewish and Arab women ($P < 0.0001$) were statistically significant [Table 1 and Figure 2].

RECTAL CANCER

In 2012, 842 new patients were diagnosed with rectal cancer. From 1980 through 2012, the age-adjusted incidence rates (per 100,000) fell from 16.5 to 10.6 cases among Jewish men (-35% , $P < 0.05$) and 12.7 to 7.3 cases per 100,000 among Jewish women (-42% , $P < 0.05$). In contrast, in the Arab population, the rates in men increased from 2.2 in 1980 to 7.1 cases per 100,000 ($+220\%$, $P < 0.05$). The corresponding rates in women were 2.6 and 6.9 cases per 100,000 (161% , $P < 0.05$) [Table 1, Figure 3].

OTHER GI CANCERS

For the other five types of gastrointestinal malignancies (pancreas, liver, gallbladder, esophagus, and small bowel), we found no significant change in the incidence through the years or between the different ethnicities. Data are summarized in Table 1.

DISCUSSION

The Israeli population is a mix not only of Jews immigrating from all over the world representing different environmental variables, but of Jewish and Arab populations as well [13]. The Arab population in Israel is a separate ethnic group from the Jewish population and has a different lifestyle and different nutritional habits and environmental exposures [14].

Tarabeia et al. [15] showed a marked increase in the incidence of lung cancer among Israeli Arab men and attributed this to changes in lifestyle, particularly in dietary habits [15]. The difference in dietary patterns of Jewish and Arab populations was considered in the past as an explanation for different mortality and morbidity rates in several diseases [16]. In that report [16] Green showed that age-adjusted mortality rates from colorectal cancer are about three times as high and breast cancer mortality rates about twice as high in the Jewish population compared to the Arab population.

Of the 26,000 new cancer patients diagnosed with malignancy annually, around a fifth are of the GI tract [11]. The most common ranking GI malignancy is colon cancer followed by rectal, gastric, pancreatic, liver, gallbladder, esophagus, and small bowel cancers [17]. Table 1 demonstrates the incidence and trends of the different GI malignancies during the period 1980–2012.

COLON CANCER

Colon cancer is the most common GI malignancy in both populations. In males, the incidence is significantly higher among Jews as compared to Arabs (age-adjusted rate 33.55 vs. 26.04 per 100,000, respectively, $P = 0.002$); in females, the trend is similar, but the difference is non-significant (25.05 vs. 22.09 per 100,000, respectively, $P = 0.182$). The trend in the Jewish population shows an increased incidence up to the year 1994, a plateau from 1994 to 2006, followed by a slow decrease. However, the Arab population shows an increased incidence. Figure 2 and Table 1 demonstrate the incidence and trends of colon cancer throughout the period. The increased incidence of colon cancer in the Arab population can probably be attributed to the adoption of a Western lifestyle and to the increasing availability of medical services, allowing for better screening and earlier diagnosis.

GASTRIC CANCER

The incidence of GC has remained steady during the period of the study with an average of 650 new patients each year. While the trend shows a decrease in the Jewish population with gastric cancer, in the Arab population an increase in both genders is noticed [Figure 2, Table 1]. The decrease in the Jewish population can be explained partially by the eradication of *Helicobacter pylori* [18,19] and by the greater inclusion of fresh vegetables and fruits in the diet [12]. Conversely, the increase in the incidence of gastric cancer in the Arab population can again be related to the adoption of a more Western lifestyle including unhealthy dietary changes [20]. Moreover, until 2005, GC was the third most common GI malignancy diagnosed in Israel, followed by pancreatic cancer. In 2006, a change in the incidence occurred, lowering the pancreatic cancer incidence to third place and, as a result, gastric cancer dropped to fourth place.

RECTAL CANCER

As in colon cancer we observed similar changes in the incidence and trend of rectal cancer in Israel, with a steady decrease in the Jewish population and an increased incidence in the Arab population [Table 1, Figure 3]. Again, these changes can be explained by increased awareness of colon and rectal cancer symptoms and their prevention. Once again, the increase in the Arab population can be explained by the improved availability of medical treatments for the Arab population, which enables better detection of medical problems as well as earlier diagnosis.

OTHER GI CANCERS

The incidence of esophageal cancer, small bowel, gallbladder, and liver cancers is very low, and the change in incidence and trends of these cancers is of lesser magnitude. All data are summarized in Table 1.

Attempting to find an explanation for the differences in GC incidence between Jews and Arabs, Rozen et al. [12] suggested that chronic alcohol intake was not the cause in the Jewish population and certainly not in the Moslem population (where alcohol is prohibited), nor could they show nutritional deficiencies. One of the explanations they suggested was that Arab men smoke more tobacco than Jewish men and tend to suffer more from diabetes mellitus and obesity. This was confirmed by the survey on obesity among Jewish and Arab men and women published by Keinan-Boker et al. [20]. A genetic component that might explain the differences in the incidence of cancer between the Arab and the Jewish populations was demonstrated in patients with breast cancer [21], but to the best of our knowledge was not proven in GC patients. The expression of the E-cadherin mutation and the association between epithelial growth factor polymorphisms and GC risk may be an issue to be investigated [22]. Because the data reported by the INCR were incomplete with regard to the stage of disease at diagnosis and the initial treatment, we have no data on this particular aspect.

CONCLUSIONS

Gastric, colon, and rectal cancers exhibit differences in incidence between Jewish and Arab populations in Israel. These differences were not observed in the other five types of less common gastrointestinal cancers.

Since Israel is a melting pot for Jews who have immigrated from all over the world – Europe, America, Asia, and Mediterranean countries – cultures differ between various ethnic groups. In our report we did not relate to these different groups but rather evaluated the results as a whole. In the future, it might be of interest to evaluate the incidence and trends in different Jewish groups, taking into account that lifestyles have likely changed following immigration.

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“Hatred is the most accessible and comprehensive of all the unifying agents. Mass movements can rise and spread without belief in a God, but never without belief in a devil”

Eric Hoffer (1902-1983), American moral and social philosopher