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# Epidemiology of Colorectal Cancer in Iraq, 2002–2014

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## Abstract

**Objectives:** After cardiovascular diseases, cancer is one of the major causes of death in Iraq but there is scarcity of data on cancer. This study aimed to estimate the incidence rate of colorectal cancer in Iraq and its distribution and determine its trend in Iraq from 2002 to 2011.

**Methods:** The necessary data for recording the incidence of colorectal cancer in Iraq were obtained from three main sources including the cancer registry for the period of 2002–2014. Data included information on gender, age, geographical distribution, site of tumors, and histology types.

**Results:** A total of 7,246 cases of CRC were registered in the cancer registry for the period 2002–2011 and 706 cases in the National Cancer Hospital between

2012 and 2014. Male to female ratio varied from 1.17:1 to 1.28:1. About 40%–46% of cases were diagnosed in the age group of 40–59 years. The incidence rate increased from 2.75/10<sup>5</sup> pop in 2002 to 3.26/10<sup>5</sup> pop in 2011. Adenocarcinoma constituted 84.0% of all cases. Of the 706 registered cases during 2012–2014, 95% were diagnosed by histology of primary site. The degree of differentiation was moderate in 56% of cases. About 26% of cases were localized, 55.9% and 16% were with regional, and distant metastasis, respectively.

**Conclusion:** Iraq has a low CRC incidence rate but with a steady increase overtime. It is crucial to implement preventive strategies to control CRC in Iraq and to establish public awareness program about CRC and the importance of screening.

**Keywords:** colorectal cancer, epidemiology, trend, Iraq

## Introduction

Colorectal cancer (CRC) is the development of cancer in the colon or rectum due to the abnormal growth of cells in the inner lining of the colon or rectum that have the ability to invade or spread to other parts of the body. It typically starts as a benign tumor, often in form of polyp which over time becomes cancerous. Colorectal cancer affects men and women of all racial and ethnic groups, and is most often found in people aged 50 years or older<sup>(1–8)</sup>

CRC is the third most commonly diagnosed malignancy and the fourth leading cause of cancer death in the world, accounting for about 1.4 million new cases and almost 700,000 deaths in 2012<sup>1</sup>. The global burden of CRC is expected to increase by 60% to more than 2.2 million new cases and 1.1 million cancer deaths by 2030.<sup>1</sup> More than two-thirds of all cases and about 60% of all deaths occurred in countries with a high or very high human development index (HDI).<sup>1</sup> There is a wide geographical variation in incidence across the world with the highest estimated rates being in Australia/New Zealand (age standardized rate (ASR) 44.8 and 32.2/ 10<sup>5</sup> pop in men and women, respectively) and the lowest in Western Africa (ASR 4.5 and 3.8/10<sup>5</sup> pop).<sup>(1,2)</sup>

CRC is considered one of the clearest markers of the cancer transition, replacing infection-related cancers in countries undergoing rapid societal and economic changes.<sup>2–4</sup> There is scarcity of data on cancer in Iraq, although it is one of the main causes of death after cardiovascular diseases.<sup>9</sup> Understanding the epidemiology and trend of CRC is very essential for reducing the burden of cancer through cancer prevention and care. Therefore, this study aimed to estimate the incidence rate of colorectal cancer in Iraq and its distribution and determine its trend in Iraq from 2002 to 2011.

## Methods

The necessary data for identifying cases of CRC were obtained from three main sources: The Cancer Registry, Al Amal National Hospital for Cancer Management, and the Directorate of Planning and Human Recourses, Ministry of Health. All registered cases of CRC in the period 2002–

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2011 were retrieved from the cancer registry. Iraq cancer registry operates within the Ministry of Health and it is responsible for collecting information related to newly diagnosed cancer cases registered from governmental and non-governmental health facilities (hospitals and histopathology laboratories) in all Iraq governorates. It relies on the cooperation of a large number of hospitals in all health directorates and clinicians in order to avail the data and/or information gathered for policy development and support in cancer research, treatment, control, prevention and surveillance. Iraq cancer registry uses standards provided by International Agency for Research on Cancer (IARC). A data collection sheet was used to gather the following information: gender, age and geographical distribution among governorates of Iraq, site of tumors (topography), and histology types of tumors (morphology). The primary site and histology of malignancies were identified and coded according to the International Classification of Diseases for Oncology Third Edition (ICDO-3).

To assess the distribution of CRC by grade and stage, all colorectal cancer cases managed in Al Amal National Hospital for cancer management from 2012 to 2014 were retrieved. The hospital provides treatment services for patients with malignant tumors through different methods consisting of chemotherapy, radiotherapy, hormonal and immunotherapy in addition to thyroid investigation and treatment. A data collection sheet was developed to gather the following information: date of diagnosis, basis of diagnoses, site of CRC, histology, grade and stage of CRC.

Data about the total population in Iraq and the governorates according to age and sex were obtained from the Directorate of Planning and Human Recourses / Ministry of Health.

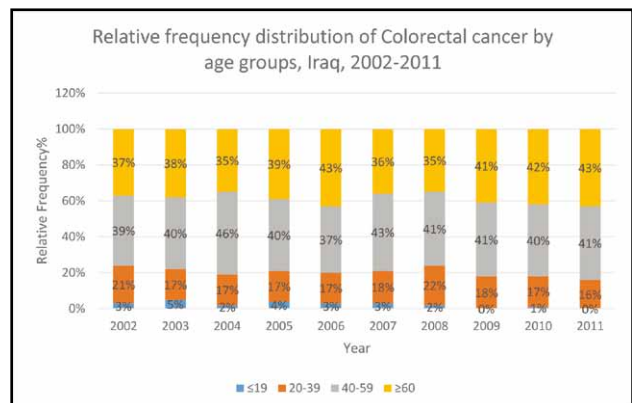
Ethical approval was obtained from the medical research committee in the Ministry of Health and from the Directorate of Public Health. Names of the patients were kept anonymous and all the data were kept in a password secured computer and were used for this research only. CanReg 4, developed by (IARC), Lyon, France, was used for data entry. Data were described using percentages.

## Results

A total of 7,246 new cases of CRC (4,021 (55.5%) males and 3,225 (44.5%) females) were registered between 2002 and 2011. Table 1 shows the annual number of CRC by gender, Iraq, 2002–2011. Males were more predominant than females in all age groups and male to female ratio varied from 1.17:1 in 2002 to 1.28:1 in 2011 (Table 1).

Year	Male		Female		Total	Male to Female Ratio
	n	%	n	%		
2002	330	54.0	281	46.0	611	1.17:1
2003	286	56.7	218	43.3	504	1.31:1
2004	392	60.7	254	39.3	646	1.54:1
2005	375	52.4	341	47.6	716	1.09:1
2006	387	54.0	330	46.0	717	1.17:1
2007	335	55.9	264	44.1	599	1.26:1
2008	378	54.5	315	45.5	693	1.20:1
2009	387	55.2	314	44.8	701	1.23:1
2010	541	55.6	432	44.4	973	1.25:1
2011	610	56.2	476	43.8	1086	1.28:1

**Table 1. Annual Number of Colorectal Cancers by Gender, Iraq, 2002–2011**



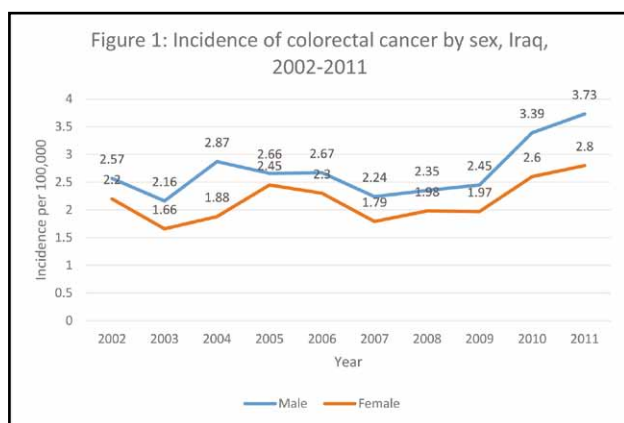
**Figure 1. Relative Frequency distribution of colorectal cancer cases by age group, Iraq, 2002–2011**

Figure 1 shows the distribution of CRC according to age groups. For most years between 2002 to 2011, 40% to 46% of cases were diagnosed in the age group of 40–59 years. Almost one third of cases were diagnosed after 60 year of age.

This study demonstrated a steady rise in the incidence rate of CRC in Iraq from  $2.75/10^5$  pop in the year 2002 to  $3.26/10^5$  pop in the year 2011. It was higher in males than females during the same period (Figure 2). The highest incidence rates were in Kirkuk ( $3.2/10^5$  pop), Najaf ( $3.03/10^5$  pop) and Baghdad ( $3.0/10^5$  pop) governorates, while the lowest incidence rates were in Salahaldin

Site of the tumor	Female		Male		Total	
	n	%	n	%	n	%
Anus and anal canal	17	5.4	10	2.6	27	3.8
Colon	145	45.7	170	43.7	315	44.6
Recto sigmoid junction	6	1.9	9	2.3	15	2.1
Rectum	149	47.0	200	51.4	349	49.4
Total	317	100.	389	100	706	100

**Table 2. Frequency distribution of patients with colorectal cancers by site of the tumor according to gender, Al Amal Hospital, Baghdad 2012–2014**



**Figure 2. Crude Incidence Rates of Colorectal Cancer Cases by Gender, 2002–2011**

(1.07/10<sup>5</sup> pop), Erbil (1.09/10<sup>5</sup> pop) and Wasit (1.15/10<sup>5</sup> pop) governorates.

Histology was verified for 4,950 cases (68.3%) only. Adenocarcinoma constituted 84.0% of all colorectal cancers, mucinous adenocarcinoma constituted 4.0%, epithelial tumor constituted 2.7%, squamous cell carcinoma constituted 2.1% and carcinoma (NOS) type constituted 1.4%.

To assess the distribution of CRC by site of tumor, the analysis was limited to 706 cases (317, (44.9%) females and 389, (55.1%) males) that were registered in Al Amal National Hospital for Cancer Management from 2012 to 2014. A total of 678 cases (95%) were diagnosed by histology of primary site, 16 (2%) cases by histology of metastasis, while 6 (1%) cases were diagnosed by cytology and 4 (1%) cases by surgery. Among those, the commonest site was the rectum in 349 (49%) patients followed by colon in 315 (45%) patients, anus and anal canal in 27 (4%) patients, and recto sigmoid in 15 (2%) patients. Table 2 shows the distribution of CRC cases by site of tumor according to gender, in Al Amal Hospital, Baghdad, 2012–2014. The degree of differentiation of CRC was moderate in 393 (56%) cases, well differentiation

in 116 (16%) cases, and poor differentiation in 78 (11%) cases. The rest of cases 119 (17%) were of unknown differentiation. According to TNM classification of tumor, 2.1% of cases were in situ, 26% of cases were localized, 55.9% of cases were regional, 16% of cases were with distant metastasis, and 0.5% of cases were of unknown extent.

## Discussion

This study demonstrated a steady rise in the incidence rate of CRC in Iraq from 2.75/10<sup>5</sup> pop in the year 2002 to 3.26/10<sup>5</sup> pop in the year 2011. The steady increase in the incidence rate in Iraq might be explained by the possible interaction of genetic and environmental factors including physical inactivity, use of tobacco and alcohol, and dietary habits.<sup>9</sup>

The average incidence rate in Iraq of 2.54/10000 population is similar to the low incidence rates in other Eastern Mediterranean countries including Jordan, Palestine, Kuwait, Kingdom of Saudi Arabia, Qatar, and Iran.<sup>10–17</sup> Much higher incidence rates were reported in North America, Australia, Europe, Japan and Singapore.<sup>1,2,5,6,18</sup>

Similar to the previous studies in the region, the majority (80%) of cases occurred at age of 40 and above.<sup>10–14</sup> Males were slightly predominant with a male to female ratio being ranged from 1.09:1 to 1.31:1 over the study period. This finding is consistent with that reported in Kingdom of Saudi Arabia, Iran and Qatar.<sup>13,14,16,17</sup>

Our finding that the incidence rate was not uniformly distributed among governorates had been shown in other studies in Iran and Kingdom of Saudi Arabia.<sup>13,17</sup> The variation in incidence rate of CRC cases in Iraqi regions might be explained by the difference of exposure to risk factor as types of food, exposure to chemical weapons at war time and accuracy of registration. The interactions between these factors as well as the genetic characteristics of Iraqi populations might also have a pivotal role.

Histological types of CRC revealed that adenocarcinoma represent the commonest type with more than half of adenocarcinomas was of moderate differentiation. Similar finding had been reported in other countries including Kingdom of Saudi Arabia, USA and Iran.<sup>14,17,19</sup> The predominance of adenocarcinoma might be explained by the high rate of smoking in Iraq in which smoking plays an important role in the formation and growth of adenomatous polyp, the precursor of CRC. Evidence demonstrated that large polyp found in colon and rectum was associated with long-term smoking.<sup>20</sup>

The finding that the rectum was the commonest site of CRC is consistent with the finding of previous studies.<sup>14,17</sup> The difference in the location of cancer according to gender was seen in this study as well as other studies in Qatar and Kingdom of Saudi Arabia.<sup>16,17</sup> The distribution of patients according to the stage of cancer is similar to that in other countries of the world.<sup>21</sup>

In conclusion, Iraq has a low CRC incidence rate but with a steady increase overtime. The majority of colorectal cancers are of adenocarcinomas and the most frequently affected site was rectum. Most cases presented at time of diagnosis were at stage 3. It is crucial to implement preventive strategies to control CRC in Iraq and to establish public awareness program about CRC and the importance of screening.

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