

Incidence of colorectal cancer in Kashmir valley, India

Gul Javid · Showkat Ali Zargar · Shabir Rather · Abdul Rashid Khan ·
Bashir Ahmad Khan · Ghulam Nabi Yattoo · Altaf Shah · Ghulam Mohamad Gulzar ·
Jaswinder Singh Sodhi · Mushtaq Ahmad Khan · Abid Shoukat-Deeba Bashir

Received: 27 October 2009 / Accepted: 4 December 2010 / Published online: 12 February 2011
© Indian Society of Gastroenterology 2011

Abstract

Background There is wide variation in the incidence of colorectal cancer globally and also within the same country among different racial or ethnic groups. The present population-based study was undertaken to determine the incidence of colorectal cancer in Kashmiri population which is non-migratory and ethnically homogeneous having stable food habits.

Methods Over a period of one year, all newly diagnosed and histological proved cases of colorectal cancer in all possible areas, where such patients are diagnosed and treated were prospectively registered.

Results A total of 212 cases of colorectal cancers were registered; of them 113 (53.3%) originated in the colon and other 99 (46.7%) in rectum. Male to female ratio was 1.2:1. The crude incidence rate of colorectal cancer was 3.65/100,000; it was 3.78 in males, and 3.50/100,000 in females. The incidence rates for colorectal cancer in Muslims and Hindus were different. The crude incidence rate for colorectal carcinoma was highest for district Srinagar 6.19/100,000 (urban area) and lowest for district Kupwara

(rural area) 1.59/100,000. The highest numbers of cases were detected in the age group 55–59 years ($n=34$). The age-specific rate for colorectal carcinoma was highest in the age group 55–59 years (17.21/100,000), followed by 65–69 years (14.86/100,000). The age standardized incidence rate was 4.52/100,000 per year. The truncated age adjusted incidence rates in age group 35–64 years was 8.31/100,000; while that for colorectal carcinoma was 8.77/100,000 in males and 7.66/100,000 in females.

Conclusion We conclude that the incidence of colorectal cancer in Kashmir valley is similar to that reported in the rest of India.

Keywords Age specific incidence rate · Age standardized incidence rate · Colorectal carcinoma · Crude incidence rate · Truncated age adjusted incidence rate

Introduction

Globally, cancer of the colon and rectum is the fourth most common cancer in males and third leading cause of cancer in females with mortality paralleling incidence [1]. In 2006, there were an estimated 148,600 new colorectal cancer (CRC) cases in the U.S. and 58,000 related deaths [2]. The 5-year survival is 90% when CRC is diagnosed at an early stage, however, less than 40% cases are diagnosed when the cancer is still localized [3]. The frequency of CRC varies remarkably among different populations. The incidence is highest in developed countries of North America, Australia, and New Zealand, intermediate in Europe and low in Asia, South America and especially in sub-Saharan Africa [4]. In India, CRC does not figure amongst the 10 most common malignancies. The age-standardized rates of CRC in India have been estimated to be 4.2 and 3.2/100,000 for males

See editorial at doi:10.1007/s12664-010-0076-2.

G. Javid · S. A. Zargar (✉) · S. Rather · B. A. Khan ·
G. N. Yattoo · A. Shah · G. M. Gulzar · J. S. Sodhi · M. A. Khan ·
A. Shoukat-Deeba Bashir
Department of Gastroenterology,
Sher-i-Kashmir Institute of Medical Sciences,
Srinagar, Kashmir 190 011, India
e-mail: showkatzargar6@gmail.com

A. R. Khan
Department of Pathology, Government Medical College,
Srinagar, Kashmir 190 010, India

and females, respectively [5]. Inter-regional differences in the incidence of CRC, including difference among population groups living in geographic proximity but with different life styles, suggest that environment plays a role in the development of the disease [6]. Change in the location of these tumors is seen with increasing age. The proportion of tumors beyond the reach of sigmoidoscopy increases with age [7]. Subsite distribution also may differ according to ethnicity [8].

A hospital-based study from the Department of Pathology of our Institute reported four-and-half-year pattern of cancers in Kashmir. Of the total of 3,310 cancers diagnosed from January 1983 to June 1987, 189 (5.7%) originated from colon and rectum, which constituted 8.3% of all digestive cancers. It ranked as the third commonest cancer among males and fourth among females in the Kashmir valley [9]. The present study was undertaken to determine the incidence of CRC in Kashmir because there are no such study which has been undertaken previously.

Methods

The present study was done over a period of one year between 2005 and 2006. Kashmir is one of the three provinces of the state of Jammu and Kashmir, India. According to the census department of Jammu and Kashmir, the projected total population of Kashmir valley as on 2005–2006 was 5,812,037 [10]; 3,068,756 (52.53%) are males, and the male:female ratio was 1.1: 0.9.

We prospectively recorded all newly diagnosed and histological proved cases of CRC in all possible areas, where such patients are diagnosed and treated. All possible sources of assessing, investigating, and treating these patients were approached to record details. These included all three medical schools, district hospitals, private hospitals and endoscopy laboratories, histopathology laboratories in public as well as private sectors, and assessments of all death certificates in Kashmir. A postgraduate student visited each of these places every 2 weeks over a period of one year. He recorded the full information about demographic data, like age, sex, residence, occupation, and symptomatology on a predefined proforma. The colonoscopy findings, histological records, surgical findings, and histological report of the resected specimen were also recorded. Every attempt was made to avoid duplicate registration of any patient.

The incidence rates of CRC were calculated as follows [11].

- (1) Crude incidence rate (CR) was defined as an estimate of a number of new cancer cases/100,000 population at risk per year.

Table 1 Crude incidence rates of colon and rectal cancer per 100,000 population

Parameters	Males	Females	Total
Total population	3,068,756	2,743,281	5,812,037
Colon cancer ($n=113$)	1.95	1.89	1.94
Rectal cancer ($n=99$)	1.82	1.71	1.70
Total colorectal cancers ($n=212$)	3.78	3.50	3.65

- (2) Age specific incidence rate (ASR) refers to the number of cases of cancer among individual in each specific age category (five-year age group)/100,000 per year.
- (3) The age standardized incidence rate (ASIR) is the rate that would have occurred if the observed age specific rate had operated in a standard world population age structure. The number of individuals in each age group (five-year age group) in a standard world population was multiplied by the corresponding incidence rate observed to obtain the number of cases that would have been expected to occur in one year in a standard world population. The expected numbers were added and the sum obtained was divided by the total number of individuals in the standard population to give the age standardized incidence rate. World population was used as standard for calculation of age standardized rates [12].
- (4) Truncated age adjusted incidence rate (TR) is an ASIR in which data are restricted to the age group range 35–64 years, and each five-year age group within it is given the weight appropriate to the standard world population.

Results

During the one year period, 212 cases of CRC were recorded. Of these, 113 (53.3%) originated in colon and 99 (46.7%) were of rectal origin. The male to female ratio for colonic as well as rectal cancer was 1.2:1. The CR of CRC is summarized in Table 1. The CR of the total population was 3.65/100,000; the rates were slightly higher in males.

Table 2 Crude incidence rate of colorectal carcinoma in districts of Kashmir valley

District	Population	Number of cases	Crude rate
Kupwara	690,182	11	1.59
Baramulla	1,241,344	31	2.5
Srinagar	1,276,010	79	6.19
Budgam	667,809	17	2.55
Pulwama	692,532	31	4.49
Anantnag	1,244,161	43	3.46
Total	5,812,037	212	3.65

Table 3 Age standardized incidence rate and age adjusted incidence rate in Kashmir valley

Age (year)	Number of cases with cancer	WHO world standard population	Kashmir	ASR	ASIR
0–4	0	514,946	633,512	0.00	0.00
5–9	0	505,066	697,444	0.00	0.00
10–14	1	499,835	697,444	0.14	0.20
15–19	8	492,280	552,144	1.45	1.63
20–24	12	477,749	499,835	2.40	2.51
25–29	15	460,895	464,963	3.23	3.25
30–34	15	442,296	389,406	3.85	3.39
35–39	18	415,561	395,219	4.55	4.33
40–44	13	383,013	308,038	4.22	3.39
45–49	14	351,047	261,542	5.35	3.99
50–54	30	312,106	215,045	13.95	9.61
55–59	34	264,448	197,609	17.21	12.86
60–64	22	216,208	180,173	12.21	10.18
65–69	19	172,036	127,865	14.86	11.04
70–74	5	128,446	92,993	5.38	3.89
75–79	4	88,343	40,684	9.83	4.53
≥80	2	87,762	58,121	3.82	2.28

ASR age specific incidence rates per 100,000 population; *ASIR* age standardized incidence rates per 100,000 population per year

The CR was higher among Muslims (3.64/100,000) as compared to Hindus (0.45/100,000). The CR among residents of Srinagar district was highest (6.19) and that of Kupwara district (border district of the valley) was lowest (1.50; Table 2). The highest number of cases ($n=34$) were detected in the age group 55–59 years. The ASR was highest in the age group 55–59 years at 17.21/100,000 followed by the age group 65–69 years at 14.86/100,000.

Table 4 Age standardized incidence of colorectal cancer/100,000 populations around the world (Ref. [4])

Countries	Male	Female
U.S., Detroit, Black	35	27.9
U.S., Connecticut, Black	30.9	25.2
U.S., Connecticut, White	30.4	21.6
France, Bass-khin	30.2	–
Australia	28.4	21.0
Canada	26.9	21.3
Germany	25.5	20.4
Israel	24.9	19.9
U.K., Scotland	23.7	19.4
China, Hong Kong	22.5	18.8
New Zealand	21.5	16.0
Sweden	17.7	15.9
Chinese, U.S., Los Angles	18.3	–
China, Shanghai	12.2	10.8
Singapore	7.6	4.0
Mumbai, India	3.7	3.0
Kuwait	4.8	3.5

The ASIR was 4.52/100,000 per year (Table 3). The truncated incidence rates in age group 35–64 were 8.31/100,000. The truncated incidence rate was 8.77/100,000 in males and 7.66/100,000 in females (Table 5).

Discussion

The study was undertaken to find out the incidence of CRC in Kashmir valley. This population is mostly non-migratory,

Table 5 Comparison of population-based cancer registry in five cities of India from 2001 to 2003 (Ref. [5])

States		Males		Females	
		CR	TR	CR	TR
Delhi	Colon	1.6	5.1	1.2	3.8
	Rectum	1.4	3.5	1.0	2.9
Mumbai	Colon	2.0	4.3	1.7	3.3
	Rectum	2.0	4.5	1.5	3.1
Bangalore	Colon	2.3	5.7	1.9	4.9
	Rectum	2.2	4.8	1.7	4.0
Barshi	Colon	–	–	0.3	0.4
	Rectum	1.0	1.4	0.6	1.4
Bhopal	Colon	1.4	4.0	0.6	1.5
	Rectum	1.5	4.3	1.4	3.5
Kashmir valley	Colon	1.95	4.2	1.89	4.5
	Rectum	1.82	4.2	1.71	4.1

CR crude incidence rate; *TR* truncated incidence rate

ethnically homogeneous with stable food and personal habits and majority of the patients report to various hospitals, and other medical centers within the valley. Patients rarely go outside the valley for treatment. The total accessible population of the valley formed the actual study group and is truly representative sample of the general population. We included only patients with histologically-verified colorectal cancer.

The CR for CRC in the present study was 3.65/100,000; 3.78/100,000 among men and 3.50/100,000 among women. The CR from Mumbai for colon cancer has been reported as 2.0/100,000 among males and 1.7/100,000 among females, and for rectal carcinoma 2.0/100,000 among males and 1.5/100,000 among females. In the present study, the age-standardized incidence rate was 4.52/100,000 population. This statistic for CRC shows wide variation from country to country and also within the same country among different racial or ethnic groups (Table 4). The incidence rates (per 100,000 population) for CRC based on 137 population-based registries worldwide were reported as follows: U.S. Blacks 50.1, U.S. Whites 42.9, Asian-Pacific Islands 28.6, and Indian/Alaskan and Hispanics 28.4. The lowest incidence of CRC has been reported from Seiff, Algeria 0.4/100,000 [13].

The large bowel is the leading site for cancer in developed countries whereas, small bowel cancers are rare worldwide. The results of the present study with ASIR of 4.52/100,000 population are lower than reported from Europe and the United States, and Chinese living in China [14–16], but is similar to the rates from other cities of India, like Bangalore, Bhopal, Delhi and Mumbai [5, 17] (Table 5). The incidence rates of both large and small bowel cancers are low in India. The incidence rates of colon cancer in eight population registries vary from 0.7 to 3.7/100,000 among men and from 0.4 to 3/100,000 among women. For rectal cancer, the incidence rates vary from 1.6 to 5.5/100,000 among men and from 0 to 2.8/100,000 among women. The rural incidence rates of large bowel cancers among in Indians are approximately half of the urban rates [17].

The incidence rates of CRC have been associated with race, food habits, life style patterns, and other factors. The highest incidence rates of CRC were observed from 1998 to 2002 in registries from North America, Oceania, and Europe, including Eastern European countries in contrast to lowest incidence rates reported from registries of Asia, Africa and South America. These high rates in the former regions are most likely due to the increased “Westernization” such as, obesity and physical inactivity [14]. The increasing prevalence of obesity and decreasing physical activity in many parts of the world, resulting from “Westernization,” is likely to increase the incidence of CRC in countries with low rates if these behaviors are not modified.

In a population based study in Kashmir, we reported a significantly higher incidence rates of esophageal and gastric cancer compared to other parts of India and observed a relationship between these cancers and food and personal habits of Kashmir [18]. Interestingly, the incidence rates for CRC are almost similar to those reported from other cities of India; it appears that a well designed case-control study will be required to address the issue of role of diet and personal habits with CRC among Kashmiris. The drawback of our study is that there may be under reporting of data, as all patients may not report to the doctor and many more would die without a histological proof of the disease. Also, patients with histological proof of metastatic deposits may not be investigated for a primary tumor in the colon.

In India, about 26.6% increase is expected in the registered number of the total number of cancer cases in five cities, which are Delhi, Mumbai, Bhopal, Chennai and Bangalore for the year 2008. Around 52.68% increase is projected for Delhi and a marginal decline of 3.25% for the year 2008 for Mumbai. The age adjusted analysis indicates that Mumbai is experiencing the highest incidence rate among the five cities studied. It is estimated that about 50% cancer mortality will be in the age group 55 and above years [19].

In conclusion, the incidence of CRC in Kashmir valley is similar to that reported in the rest of India.

References

1. Parkin DM, Pisani P, Ferlay J. Global cancer statistics. *CA Cancer J Clin.* 1999;49:33–64.
2. Jemal A, Siegel R, Ward E, et al. Cancer statistics. *CA Cancer J Clin.* 2006;56:106–30.
3. Ries LA, Wingo PA, Miller DS, Howe HL, Weir HK, Rosenberg HM. The annual report to the nation on status of cancer, 1973–1977, with a special report on colorectal cancer. *Cancer.* 2000;88:2398–424.
4. Parkin DM, Whelan SL, Ferlay L, Youn RJ. Cancer incidence in five continents (IARC Sci.Publ.No.143) Series. Lyon, International Agency for Research on Cancer. 1997;143:566–7.
5. National Cancer Registry Programme Consolidated Report of Population based cancer. Registries 2001–2004 Chapter 5–6. www.icmr.nic.in.
6. Potter JD. Colorectal cancer: molecules and population. *J Natl Cancer Inst.* 1999;91:916–32.
7. Cooper GS, Yuan Z, Landefeld CS, Johanson JF, Rimm AA. A national population-based study of incidence of colorectal cancer and age; implication for screening in older Americans. *Cancer.* 1995;75:775–81.
8. Demers RY, Severson RK, Schottenfeld D, Lazar L. Incidence of colorectal adenocarcinoma by anatomic subsite; An epidemiologic study of time trend and racial difference in the Detroit, Michigan area. *Cancer.* 1997;79:441–7.
9. Shah A, Jan GM. Pattern of cancer at Srinagar (Kashmir). *Indian J Pathol Microbiol.* 1990;33:118–23.

10. Digest of statistics. Directorate of Economics and Statistics Planning and Development Department. Government of J&K . DOS (30)04 2004-05. Government printing Press.
11. Mould RF. Introductory Medical Statistics. 3rd edition. Bristol, United Kingdom: IOP Publishing Ltd. 1998;11:332–3.
12. Nelson RL, Persby V, Turyk M. Determination of factors responsible for the declining incidence of colorectal cancer. *Dis Colon Rectum*. 1999;42:741–52.
13. Boyle P, Leon ME. Epidemiology of colorectal cancer. *Br Med Bull*. 2002;64:1–25.
14. Center MM, Jemal J, Smith RA, Ward E. Worldwide variations in colorectal cancer. *CA Cancer J Clin*. 2009;59:366–78.
15. Greenlee RT, Hill-Harmon MB, Murray T, Thun M. Cancer statistics 2001. *CA Cancer J Clin*. 2001;51:15–36.
16. Demers RY, Severasa RK, Schottenfeld D, Lazer L. Incidence of colorectal adenocarcinoma by anatomic subsite. An epidemiologic study of time trends and racial differences in the Detroit, Michigan area. *Cancer*. 1997;79:441–7.
17. Mohandas KM, Desai DC. Epidemiology of digestive tract cancers in India. V. Large and small bowel. *Indian J Gastroenterol*. 1999;18:118–21.
18. Khuroo MS, Zarger SA, Mahajan R, Banday MA. High incidence of esophageal and gastric cancer in Kashmir in a population with special personal and dietary habits. *Gut*. 1992;33:11–5.
19. Marimuthu P. Projection of cancer incidence in five cities and cancer mortality in India. *Indian J Cancer*. 2008;45: 4–7.