Increased Incidence of Early Onset Colorectal Cancer in Arizona: A Comprehensive 15-Year Analysis of the Arizona Cancer Registry

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Abstract

Introduction: The aim of this study was to investigate and analyze the incidence of early-onset colorectal cancer in Arizona, using the Arizona Cancer Registry.

Methods: We performed a retrospective analysis of patients with colorectal cancer reported in the Arizona Cancer Registry from 1995-2010. Outcome measure: incidence of CRC in patients younger than 50 years.

Results: A total of 39,623 cases of colorectal cancer were reported to the Arizona Cancer Registry during a period of 15 years. Overall, there was a 17% decrease in the incidence of CRC. However, there was a 23% increase in incidence among patients in the age group 10-50. The most significant increase (102%) in overall CRC incidence was seen in the age group 10-29. The highest increase (110%) in incidence of colon cancer was observed in the same age group, while the most significant increase in incidence rates (225%) of rectal cancer was seen in the age group 30-34.

Conclusion: Although there is an overall decrease in incidence of colorectal cancer in Arizona, alarming increase in incidence of early-onset CRC was observed; mirroring the national trends.

Keywords: Colorectal cancer; Mortality of colorectal cancer; Incidence of colorectal cancer; Arizona state

Introduction

Colorectal cancer (CRC) is the second leading cause of cancer related deaths in the United States [1,2]. The American Cancer Society estimates that in 2015 about 132,700 people will be diagnosed with colorectal cancer and about 49,700 patients will die from this disease [3]. Although the overall CRC incidence and mortality have been declining in both men and women since about 1990 [4], most likely due to progressive improvements in population screening, several recent studies have shown alarming increase in the incidence of CRC in patients younger than 50 [5,6]. CRC incidence among patients younger than 50 years ranges from 0.85 per 100,000 for the age group 20-24 to 28.8 per 100,000 for the age group 45-49 [6]. Recent studies that used the Surveillance, Epidemiology, and End Results (SEER) database have shown that more than one-tenth of the newly diagnosed CRC camo 28.8

the two age subsets, and 2. Stages of presentation of colon cancer for years 2005-2010.

Colorectal cancer was defined using the following ICD O3 codes: 8000, 8010, 8012, 8020, 8041, 8070, 8140, 8070, 8140, 8143, 8210, 8211, 8221, 8240, 8241, 8243, 8244, 8245, 8246, 8261, 8262, 8263, 8310, 8470, 8480, 8481, 8490, 8560, 8890. We defined location of colorectal Cancer as colon, recto sigmoid region, and rectum. We defined stages of the Colon Cancer as following: Stage I: Cancer present in the mucosa; Stage II: localized, invades through submucosa; stage III: lymph node involvement, and stage IV: distant spread with metastasis.

Statistical analysis was performed using SAS 9.4. We performed linear regression analyses testing the correlation between year of diagnosis and incidence of disease overall and for several subgroups. We used a chi square test to compare the distribution of stages of colorectal cancers for under and above 50. Standardized residuals were computed to assess the deviation from the null hypothesis of no difference between younger and older patients. A p-value 0.05 was considered statistically significant"

Results

A total of 39,623 cases of colorectal cancer were reported to the Arizona Cancer Registry from 1995-2010. There were 53.1% males and the mean age at diagnosis was 69.5 ± 23.3 years. The mean age of diagnosis in females was 70.1 ± 24.3 years. 92% of the patient with a diagnosis of CRC was above the age of 50. In terms of ethnicity, 85% of the patients were White followed by the following ethnicities: Black: 2%; Hispanic: 8%, American Indians: 1.6%, and Asian and Pacific islanders: 1.1%. During the study period, we found a 3.1% decrease in the average age of diagnosis, 70.8 years to 68.1 years. Overall, there was a 17% decrease in the incidence of CRC. The mean incidence was 54 per 100,000 in the year 1994, which declined to 38 per 100,000 in the year 2010.

Figure 1 highlights the total CRC incidence for all ages. Once we dichotomized the population into two age groups (<50 and 50), we found that there was a 23% increase in incidence in patients younger than 50. The incidence of colorectal cancer in patients younger than 50 increased from 11 per 100,000 in 1994 to 21.9 per 100,000 in 2010 (p-value: 0.01).

Figure 2 highlights the total CRC incidence for the two age groups. Further analysis of the data in terms of 10 years increments revealed that there is a statistically significant rise in incidence of colorectal cancer in patients aged 45 compared to patients aged 35 (p-value <0.001). Table 1 highlights the incidence in 10 year increments. Similarly, we found a 58% increase in the incidence of colorectal cancer in patients younger than 29 years, 26% increase in CRC incidence in patients aged 30-39, and an 8% increase in CRC incidence in patients aged 40-49. A 225% increase in incidence of rectal cancer was seen in a group of patients 30-34.

For colon cancer, a 110% increase in incidence was seen in patient group 10-29. Figure 3 highlights the incidence in four age groups. Analysis of the data in terms of location of CRC in patients younger than 50 revealed that there has been a 76% increase in the incidence of cancer in the recto-sigmoid region, 3% increase in the rectal region, and 5% increase in the colon region. Figure 4 highlights the incidence based on location of the colorectal cancer.

In patients under the age of 50, 39% of patients presented with stage IV disease, followed by stage I disease in 27% of the patients. CRC

Stage II and III occurred in 21% and 13% of the patients, respectively. Age based (<50 years vs. >50 years) comparison of the grades of CRC in presentation, we observed that the younger age group was more likely to present with stage IV disease compared to its older counterparts (23.5% vs. 16.5%; p<0.001). Figure 5 highlights the results using standard residuals.

Incidence of Colorectal Cancer in age groups							
	15	35	45	55	65	75	85
1995	0.21	3.2	11.1	40.7	107.4	192.9	337.4
2000	0.353	2.75	10.92	36.9	105.8	203.7	324.8
2005	0.158	3.43	11.4	34.6	87.8	168.3	269.1
2010	0.37	4.44	10.9	30	64.5	127.4	207.5

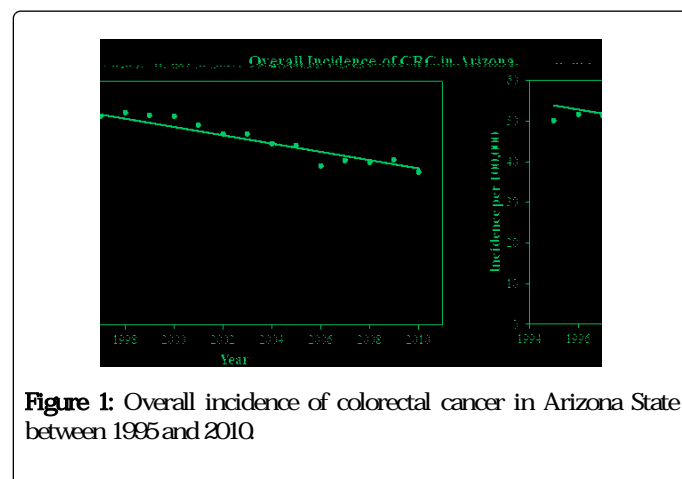**Table 1:** Incidence rates of CRC in various age groups.

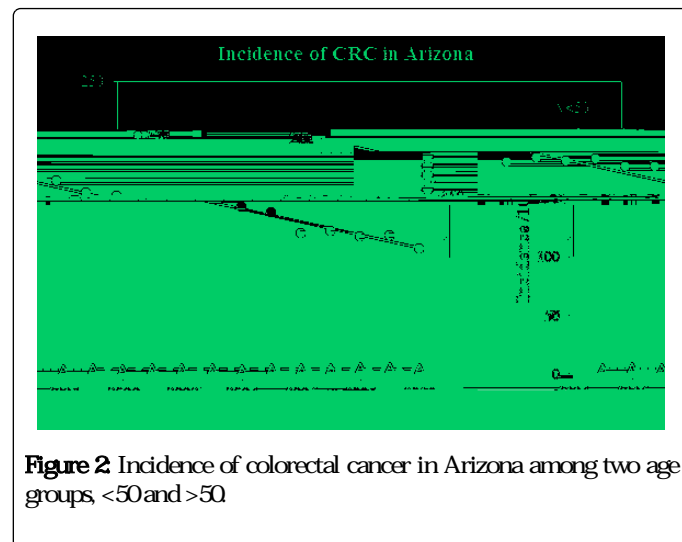**Figure 1:** Overall incidence of colorectal cancer in Arizona State between 1995 and 2010.

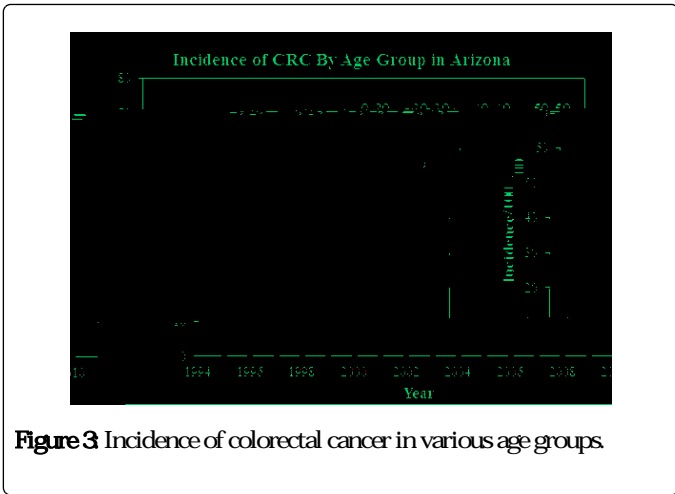**Figure 2:** Incidence of colorectal cancer in Arizona among two age groups, <50 and >50.

Figure 3: Incidence of colorectal cancer in various age groups.

Figure 4: Incidence of colorectal cancer in a group of patients younger than 50 based on anatomic location of cancer.

Figure 5: Standard residuals for colorectal cancer stages.

Discussion

Our study highlights increasing incidence of colorectal cancer in younger patients in the state of Arizona. Although the overall rate of CRC in Arizona decreased by 17% during the 15 year period; we found an alarming increase in the incidence of colorectal cancer in patients younger than 50 years.

In this study, we showed that the incidence of colorectal cancer in patients younger than 50 increased from 11 per 100,000 in 1995 to 21.9 per 100,000 in 2010. is rise appears to be in concordance with other studies using other national databases. Using the SEER database, Davis et al. showed that the most signif cUnt increase in incidence of CRC was in the age group 40-44, with an increase from 10.7 per 100,000 in 1988 to 17.9 per 100,000 in 2006 [5]. Similarly, a studies have reported that early-onset CRC incidence rates increased from year 1998 to 2007 (annual percent change (APC): 2.1%; 95% CI: 1.1% - 3.1%), whereas late-onset incidence decreased (APC: -2.5%; 95% CI: 3.0% - 2.0%) [8-11]. We have also observed that early-onset CRC are more likely to be diagnosed at more advanced stages what is in agreement with one large-scale study reporting that patients with early-onset CRC are signif cUhtly more likely to present with stage III/IV disease compared to CRC patients with late-onset disease. For colon cancer, 63.4% of early-onset patients and 49.0% of late-onset patients were diagnosed with more advanced (stage III/IV) disease (p<0.01). 57.3% of early-onset and 46.2% of late-onset colorectal cancer were diagnosed at later stages (p<0.01) [11,12]. We believe that later stage at the time of diagnosis is possibly related to the lower screening rates and/or failure to recognize and evaluate] pat
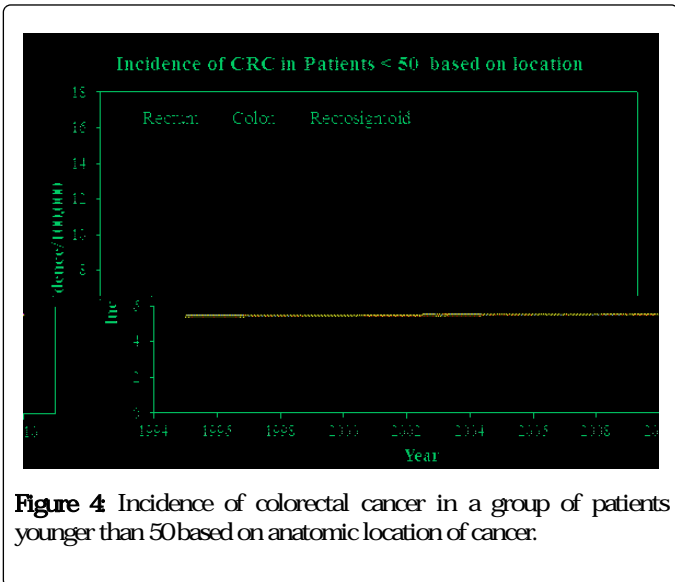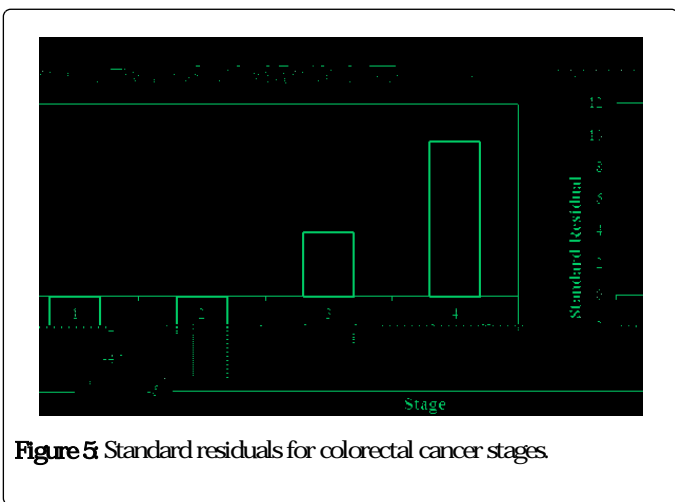
undergo timely sigmoidoscopy, if not a full colonoscopy. Identifying
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