Published in final edited form as:
Clin Gastroenterol Hepatol. 2012 September ; 10(9): 997–1001. doi:10.1016/j.cgh.2012.04.015.

Ethnic and Gender Disparities in Colorectal Neoplasia Among Hispanic Patients Undergoing Screening Colonoscopy

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Abstract

Background & Aims—Colorectal cancer (CRC) is a highly prevalent cancer among US Hispanics. In Puerto Rico (PR), CRC is the third cause of cancer death in men and the second cause of cancer death in women. There is limited published data on the prevalence of colorectal neoplasia (CRN) among US Hispanics. We determined the prevalence of CRN (colorectal adenomas and cancer) among asymptomatic screening PR Hispanic subjects and evaluated associated risk factors with CRN.

Methods—A retrospective review of the medical, endoscopic and pathology records of individuals who underwent first-time screening colonoscopy at an ambulatory gastroenterology practice from January 1, 2008 to December 1, 2009. Prevalence of CRN (overall and advanced) documented by colonoscopy and pathology report was calculated for the complete cohort and by gender.

Results—Out of the 745 Hispanic individuals who underwent screening colonoscopy during the study period, the prevalence for overall CRN was 25.1% and for advanced CRN (1 cm and/or advanced histology) was 4.0%. Prevalence of CRN was higher for men compared to women (32.0% vs. 20.6%, p =0.001; OR=1.92, 95% CI 1.4–2.6). CRN was more frequently located in the *proximal* colon (67.7% proximal vs. 32.3% distal). Family history of CRC was associated with *advanced* CRN (OR = 2.73, 95% CI 1.10 – 6.79).

Conclusions—CRN was more common among Hispanic men compared to women and increased with age. CRN among Hispanics was predominantly located in the proximal colon. Our findings suggest ethnic and gender disparities in CRN patterns, which may be related to genomic admixture and have important implications in screening algorithms for Hispanics.

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Disclosures- None of the authors have any commercial conflicts to disclose.

Writing Assistance - Not applicable

Authors Contributions- L.L. (Acquisition of data, manuscript drafting, interpretation of data); F.R.M. (study concept and design and interpretation of data, critical review), J.H.M (acquisition of data, critical review), M.V.(acquisition of data, analysis and interpretation, critical review), and M.C.C. (study concept and design, analysis and interpretation, drafting of manuscript, statistical analysis).

Keywords

Hispanics; Colorectal neoplasia; Screening Colonoscopy; colonic adenomas

INTRODUCTION

Overview and research rationale

Hispanics are the second largest and fastest growing ethnic minority population in the US comprising 50 million according to the 2010 US Census[1]. With a population of 3.7 million, Puerto Rico (PR) is the only predominantly Hispanic US territory and Puerto Ricans account for close to 10% of all US Hispanics[1]. In both the US and PR, colorectal cancer is the second cause of cancer, affecting an estimated 10,400 US Hispanics and 1,485 PR Hispanics in 2011.[2–4] Race and ethnicity appear to impact colorectal cancer incidence and mortality, and location of tumor. Studies have shown lower rates of colorectal cancer incidence and mortality among Hispanic patients compared to non-Hispanic Whites.[5, 6] In the US, African Americans are more likely to have tumors (OR= 4.37; 95% CI: 1.16–16.42) in the proximal colon compared with Non Hispanic Whites.[7] In contrast, Hispanics may have higher likelihood of distal tumors compared to non-Hispanic Whites and African Americans[7–10] which may support sigmoidoscopy as an acceptable screening modality for this ethnic US minority. Very few studies have addressed the prevalence of colorectal adenomas among US Hispanics.[8, 11, 12] Recent data from colonoscopy-based colorectal cancer screening studies have reported similar colorectal adenomas prevalence for non-Hispanic Whites and US Hispanics.[11]

Screening guidelines for colorectal cancer emphasize the importance of screening for cancer prevention by identifying and removing pre-cancerous lesions (polyps). Current colorectal cancer screening guidelines from the Multi-Society Task Force on Colorectal Cancer, the American Cancer Society, and the American College of Radiology recommend initiation of screening at age 50 years for asymptomatic individuals without family history of colorectal cancer from all racial/ethnic backgrounds. [13] The American College of Gastroenterology has made specific recommendations for African Americans, decreasing the starting age for colorectal cancer screening to age 45 based in the increase incidence and mortality rates observed among this racial group.[14, 15] Compliance with colorectal cancer screening guidelines have been historically low among US and PR-Hispanics, with reported screening rates in the 30%–40%, much lower than that reported for other racial and ethnic groups.[16] The decrease adherence with colorectal cancer screening guidelines among Hispanics may contribute to the limited decrease in colorectal cancer mortality rates observed compared to non-Hispanic Whites.[17]

Our primary goal was to determine the prevalence and location of colorectal neoplasia among asymptomatic adult Puerto Rican Hispanics undergoing screening colonoscopy. As Hispanics are an admix population, resulting from generations of admixture of European, Amerindian, and African individuals[18, 19] the contribution of each racial genotype to the risk of colorectal neoplasia may vary among Hispanic subgroups. Since Puerto Rican Hispanics have a higher proportion of African genes compared to other Hispanic groups, the epidemiology and clinical phenotype of colorectal neoplasia may resemble that of African Americans.[20] Understanding the clinical characteristics of colorectal neoplasia among different ethnic and racial groups may weight into CRC screening algorithms, which were based on data from non-Hispanic Whites.

METHODS

Study design and Study population

A retrospective review among individuals who underwent screening colonoscopy at a large ambulatory gastroenterology practice in Puerto Rico was performed. Medical record data was abstracted from the clinical notes, pathology and endoscopy reports of asymptomatic adults ≥ 50 years old, who underwent colonoscopic examination for CRC screening. Data abstracted included: gender, age at colonoscopy, indication for colonoscopy, family history of colorectal neoplasia, presence of colorectal neoplasia, size of neoplasia (in millimeters), location (cecum, ascending, transverse, descending, sigmoid, or rectum) and histology (tubular adenoma, tubulovillous adenoma, villous adenoma, serrated adenoma, hyperplastic, and adenocarcinoma).

The primary outcome of the study was the prevalence of colorectal neoplasia. Secondary outcomes included prevalence of colorectal neoplasia by gender, by age group, and by colonic segment (proximal vs. distal). Colorectal neoplasia included both adenomas and cancer. Adenomas were defined as any polyp with *histologically confirmed* tubular, villous/tubulovillous, or serrated adenoma. Advanced adenomas were those adenomas ≥ 1 centimeter or with villous, tubulovillous or high-grade dysplasia histologic diagnosis regardless of size. Neoplasia location was classified as: proximal (cecum, ascending colon, hepatic flexure, transverse colon and splenic flexure), and distal (descending colon, sigmoid colon, recto-sigmoid junction and rectum). Individuals included were men and women of 50 years of age or older who received a complete screening colonoscopy to the cecum (or terminal ileum).

Only individuals who underwent screening colonoscopy between the periods of January 2008 to December 2009 were included in the final analysis. To determine the true prevalence of CRN in a first-time screening cohort, we excluded subjects who had any history of prior colonoscopy recorded or reported by patient (N=288). Individuals with indications for colonoscopy other that screening, including surveillance for history of adenomas or cancer (N = 338), and subjects symptomatic indications (change in bowel habits, hematochezia, melena or bleeding, and subjects with anorectal discomfort or pain on defecation), or positive fecal occult blood test (FOBT) were also excluded (N=652). The study was a collaboration of the University of Puerto Rico Comprehensive Cancer Center and the *Instituto de Gastroenterologia de Puerto Rico*, a large private gastroenterology practice in San Juan Puerto Rico, and was approved by the UPR Medical Sciences Institutional Review Board.

Statistical Analysis

Descriptive statistics including median, mean, SD and frequencies were used to characterize the study population. Association between dependent variable (colorectal neoplasia) and independent variables (gender, age, family history of neoplasia) were evaluated using Chi square, Fisher exact and t-tests, as appropriate. Logistic regression models were constructed for evaluation of the association of colorectal neoplasia with all independent covariates. Significance level was set at 0.05 percent. Statistical program STATA version 10.0 was used to analyze the data.

RESULTS

A total of 745 individuals (451 women; mean age 58.9 ± 10.3) underwent screening colonoscopy between January 2008 to December 2009. Clinical characteristics of the complete cohort are described in Table 1. Most colonoscopies were rated as having very good or good preparation (90.6%) and cecal intubation was reached in 99.7% of cases.

Family history of colorectal neoplasia (either first- or second-degree relative) was reported by 17% (124) of the patients.

Prevalence of Colorectal Neoplasia

Colorectal neoplasia (CRN) was seen in 25.1% (N=187) of individuals undergoing first-time screening colonoscopies, while 63.9% (476) had normal colonoscopies (Table 1). The mean size for CRN was 4.7 mm (range 2–25 mm) and most subjects (51%) had only one colorectal neoplastic polyp. Clinical characteristics associated with the prevalence of colorectal neoplasia are presented in Table 2. Men were significantly more like than women to present with colorectal neoplasia, with 31.9% of men vs. 20.6% of women (p=0.001). Similarly, men had more number of neoplastic polyps than women (1.81 ± 0.80 vs. 1.51 ± 0.71 polyps, p = 0.007).

Prevalence of CRN increased significantly with age from 23% to 33.8% (p trend = 0.03) between the age groups of 50–59 years and ≥ 70 years, respectively. There was no statistically significant difference in prevalence of CRN among individuals who reported having a family history of CRN compared to those without such history. Evaluation of several clinical characteristics with the presence of CRN among Hispanics subjects using a multiple logistic regression model demonstrated that gender and age were independently associated with CRN (Table 2). Men were almost two times more likely than women to have CRN (OR = 1.76, 95% CI 1.25–2.47).

Prevalence of advanced CRN (defined as lesions with ≥ 10 mm in size and/or with advanced histology) was limited to 4.0% (N=30) of the screening cohort (Table 3). More men than women had advanced adenomas, although the difference did not reach statistical significance (OR =1.53, 95% CI 0.68–3.42). Individuals who reported having family history of CRC were 3-times more likely to have advanced CRN compared to those without family history of CRC (OR = 2.73, 95% CI 1.10 – 6.79).

Location of Colorectal Neoplasia

Evaluation of location of CRN demonstrated that sixty-eight percent of our Hispanic subjects (n=126) had CRN located in the *proximal* colon (from the cecum to the splenic flexure) (Table 1). This pattern of proximal colonic distribution of neoplasia was observed in *both* men and women (71.2% and 64.1%, p = 0.30). Proximal location of CRN was not associated with family history of colorectal cancer (67.9% vs. 66.7%, p=0.89) or age. In Table 4 we present the associations between several demographic and clinical criteria and proximal location of CRN.

DISCUSSION

Incidence and mortality rates of colorectal cancer is lower among Hispanics compared to non-Hispanic Whites and African American, however Hispanics are diagnosed at an earlier age and with more advanced disease and they have worse survival compared to non-Hispanic Whites[21–23] In agreement with the known heterogeneity among Hispanics, recent studies indicate that cancer incidence patterns are not uniform across all US Hispanics.[24–26] We reported an overall prevalence of CRN of 25.1% and a prevalence of 4.0% for *advanced* CRN for PR Hispanics among asymptomatic individuals presenting for first-time screening colonoscopy. Our observed adenoma detection rate was similar to previously reported numbers for non-Hispanic Whites.[9, 27, 28] Wilkins and colleagues reported a prevalence of 28.9% among non-Hispanic Whites, while Kanna and colleagues reported 23% CRN in minorities.[9, 27, 28] Lee et al. recently reported on the prevalence of CRN in a large cohort of individuals (approximately 150,000 individuals; 7,654 US Hispanics) who underwent

screening colonoscopy.[11] The investigators reported a prevalence of 5.8% for advanced CRN (adenomas ≥ 10 mm and/or with advanced dysplasia) among US Hispanics and 6.2% for non-Hispanics Whites (p=0.11).[11] Our observed advanced adenoma rate of 4.0% is lower than that reported for US Hispanics. [11]

In the current study we observed a higher prevalence of CRN among men with respect to women. These observations were present for overall and advanced CRN. Similarly, men had increased mean number of CRN lesions-per-individual compared to women. Kanna and colleagues reported parallel findings with higher incidence of adenomas in men compared to women, evaluating a minority urban population in New York City primarily composed of Hispanics and African Americans.[9] They also detected a greater incidence of colorectal cancer among their cohort of individuals compared to non-Hispanic Whites and proposed that colorectal cancer screening should start at an earlier age for men from these ethnic groups. Data from the PR Central Cancer Registry for the 2004–2008 period reveals a higher incidence rate of colorectal cancer among men compared to women (50.0 vs. 35.4/100,000 population), supporting our observations of CRN been more common in PR Hispanic men than women.[3, 29, 30]

Adherence with CRC screening methods among PR-Hispanics is reported to be among the lowest when compared with other US racial and ethnic groups. For the year 2010, only 43.4% of PR-Hispanics reported undergoing CRC screening compared with 54.0% for US-Hispanics, 63.7% for African American and 66.8% for US-Non Hispanic Whites.[16] Age-adjusted incidence rates for US and PR-Hispanics for the period of 2004–2008 reflects higher incidence of CRC among PR Hispanics compared with US Hispanics (41.8 vs. 38.4 per 100,000 population, respectively). Similarly, we reported a positive annual percent change for CRC incidence and mortality among PR-Hispanics compared with other US racial and ethnic subgroups. [29] We hypothesize that as PR-Hispanics continue to acculturate to a Western lifestyle and dietary habits, the incidence rate of CRC among PR-Hispanics will continue to increase and resemble that of US. This has been shown by Pineiro et al [26] who reported on the observed increased rates of CRC among Hispanics living in Florida compared with the risk of cancer in their country of origin. Thus, our observations regarding prevalence of overall and advanced CRN are in agreement with the observed increasing trends in CRC incidence among US and PR-Hispanics.

An important observation in our study was the predominant proximal distribution of CRN, observed in two-thirds of this asymptomatic screening PR Hispanic population. This proximal location of CRN was consistent between both genders. Different from our observations, Lee et al. did not observe a proximal colonic distribution of CRN among US Hispanics undergoing screening colonoscopies.[11] However, it is important to note that US Hispanics, such as the group evaluated in Lee's study, are a heterogeneous group of individuals with a wide range of genomic admixture. Furthermore, the origin of the Hispanics included in the study was unknown and the ethnicity was self-reported.[11] Proximal (right-sided) location of CRN has been reported among African Americans.[14, 31] Since Puerto Rican Hispanics originated as a product of an admixture between Spaniard, Africans and Amerindians (Tainos),[29, 32] we proposed that our observations may reflect the African heritage of PR Hispanics. Data from the PR Central Cancer Registry also demonstrates a predominance of proximal location of colorectal cancer among women, with higher proximal colon incidence rates among older individuals.[3] These findings support the use of colonoscopy, rather than sigmoidoscopy, as the preferred CRC screening method for PR Hispanics.

In our study, we did not observe an association between family history of colorectal cancer and overall CRN prevalence. However, individuals with a positive family history of CRC

had a higher prevalence of *advanced* CRN compared to those without (30.0% vs. 13.4%, p = 0.02). Liberman and colleagues have described a lack of association between family history of colorectal cancer and CRN.[33] We recognize that other studies have stated that men with first-degree relatives with history of CRC have a higher incidence of CRC.[34] Nonetheless, we suspect that based on the fact that only half of all adenomas continue to develop into cancer, risk factors (including family history of colorectal cancer) for CRN might vary from those of colorectal cancer. Another hypothesis for our results might be that a lack of awareness of the existence of colorectal cancer and/or poor knowledge of their family history leading to under reporting.

To our knowledge our study is the first to evaluate the prevalence, anatomical distribution, and associated risk factors of CRN in asymptomatic PR-Hispanics undergoing screening colonoscopy. We describe for the first time a proximal distribution of CRN among Hispanic individuals, similar to that seen in African Americans. A limitation from our investigation is the sample size, and that the subjects were selected from a single community gastroenterology clinic, limiting the generalizability of our observations to the population of Hispanics at large as there may be clinical, socioeconomic and/or genetic differences between individuals included in this analysis and Hispanics overall. However, our subject population was meticulously selected so that our findings were representative of the average insured asymptomatic screening community-based Hispanic population. Moreover, our observations regarding prevalence rate of CRN and higher prevalence among men are in agreement with previously published data and with the epidemiologic data on colorectal cancer from the PR Central Cancer Registry.

In conclusion, PR Hispanics have similar prevalence of CRN compared to publish US non-Hispanic whites CRN prevalence data. Male sex, increasing age and family history of CRN were independent risk factors for colorectal neoplasia. Similar to African Americans, CRN was more likely to be located in the proximal colon among PR Hispanics. Our research observations confirm ethnic and gender variations in CRN patterns among PR Hispanics, implying that screening algorithms for Hispanics should emphasize the importance of colonoscopy as screening tool.

Acknowledgments

Grant Support - This publication was possible by grants 1U54RR026139-01A1 from the National Center for Research Resources (NCRR); and from grant K22 CA115913 from the National Cancer Institute (NCI).

Abbreviations

CRN	Colorectal Neoplasia
US	United States
PR	Puerto Rico

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Table 1

Clinical characteristics of the study population.

Clinical Characteristic	N (%)
Gender	
Men	294 (39.5)
Women	451 (60.5)
Mean age ± SD	58.9 ± 10.3
Family history of CRN	124 (16.6)
Cecal Intubation rate	743 (99.7)
Bowel Preparation	
Very Good	567 (76.1)
Good	108 (14.5)
Poor	70 (9.4)
Pathology *	
Normal	476 (63.9)
Hyperplastic Polyps	82 (11.0)
TA, SA, TVA, VA	185 (24.8)
Carcinoma	2 (0.3)
Location of Neoplasia	
Proximal Colon	126 (67.7)
Distal	60 (32.7)

* TA = tubular adenoma, SA= serrated adenoma, TVA= tubulovillous adenoma, VA=villous adenoma

Table 2

Clinical Characteristics according to Colorectal Neoplasia Status (N=745).

Clinical Characteristic	No CRN N = 558 N (%)	Yes CRN N = 187 N (%)	* Adjusted OR (94% CI)	P Value
Gender				
Female	358 (79.4)	93 (20.6)	1.0 (reference)	
Male	200 (68.0)	94 (31.9)	1.76 (1.25–2.47)	0.001
Age (mean ± SD)	58.2 ± 10.5	61.4 ± 10.1	1.04 (1.01–1.05)	<0.001
Age Groups (years)				
50 – 59	196 (63.6)	71 (23.0)	1.0 (reference)	
60 – 69	136 (63.2)	5 (26.9)	1.35 (0.91–1.98)	0.133
≥ 70	72 (58.0)	42 (33.8)	1.84 (0.61–1.51)	0.007
Family History CRC				
No	464(72.7)	157(25.3)	1.0 (reference)	
Yes	94(75.8)	30(24.2)	0.61–1.51	0.94

*Adjusted for age, sex, and family history of colorectal neoplasia. OR (Odds Ratios) and CI (confidence intervals) calculated using logistic regression (see methods section).

Table 3

Clinical characteristics of individuals with colorectal neoplasia according to size of lesion (N = 187).

Clinical Characteristic	Polyp < 10 mm N = 157 N (%)	Polyp ≥ 10 mm N = 30 N (%)	* Adjusted OR (95% CI)	P value
Gender				
Women	81(51.9)	12(40.0)	1.0 (reference)	0.31
Men	76(48.1)	18(60.0)	1.53 (0.68–3.42)	
Age (mean ± SD)	61.2 ± 9.8	62.0 ± 11.1	1.01 (0.97–1.05)	0.55
Age Group (years)				
50–59	75(47.8)	12(40.0)	1.0 (reference)	
60–69	47(30.0)	11(36.7)	1.60 (0.63–4.01)	0.32
≥ 70	35(22.3)	7(23.3)	1.33 (047–3.75)	0.60
Family History CRC				
No	136(86.6)	21(70.0)	1.0 (reference)	0.03
Yes	21(13.4)	9(30.0)	2.73 (1.10–6.79)	

*Adjusted for age, sex, and family history of colorectal neoplasia. OR (Odds Ratios) and CI (confidence intervals) calculated using logistic regression (see methods section).

Table 4

Factors associated with proximal location of colorectal neoplasia.

Clinical Characteristic	* Adjusted OR (95% CI)	P Value
Gender		
Female	1.00 (reference)	0.30
Male	1.39 (0.75–2.60)	
Age (mean ± SD)	1.00 (0.98–1.04)	0.59
Age Groups (years)		
50–59	1.00 (reference)	
60–69	2.16 (1.01–4.6)	0.05
≥ 70	1.24 (0.57–2.7)	0.58
Family History CRC		
No	1 (reference)	
Yes	0.94 (0.41–2.16)	0.90

*Adjusted for age, sex, and family history of colorectal neoplasia. OR (Odds Ratios) and CI (confidence intervals) calculated using logistic regression (see methods section).