

SHORT COMMUNICATION

Right-side shift of colorectal cancer in Trinidad and Tobago: A change in distribution

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ABSTRACT

Background and Objectives: Previously published epidemiologic data from Trinidad and Tobago suggested that left-sided colorectal cancer (CRC) was more common, but accepted, standardized definitions for CRC laterality were not used. This study aims to collect data from patients with CRC in Trinidad & Tobago in order to determine anatomic site using standardized definitions. **Methods:** A retrospective audit of hospital records was carried out for all patients with CRC over a 10-year period from January 1, 2011 to January 30, 2021. Standardized definitions were used to classify CRC laterality: Right-sided CRC was defined as those that arose in the cecum, ascending colon, hepatic flexure and/or transverse colon. Left-sided primaries were defined as those that originated from the splenic flexure, descending colon and/or sigmoid colon. The following data were extracted: laterality, gender, age and ethnicity. Descriptive statistical analyses were generated with SPSS version 21. **Results:** The records of 326 patients with CRC were examined in this study. There was a predominance of right-sided (43%) over left sided primaries. There was a statistically significant relationship between right sided CRC and female (58.2% vs. 41.8%; $P = 0.00168$), black ethnicity (60.2% vs. 38.6%; $P = 0.0076$) and younger age (60.9 vs. 65.9 years; $P = 0.00028$). **Conclusion:** There is a predominance of right-sided CRC in this eastern Caribbean nation, significantly associated with younger, female and black population.

Key words: colorectal cancer, anatomic site, standardized definitions

INTRODUCTION

Trinidad & Tobago is an island state in the Eastern Caribbean with a population of 1,394,969 persons. In this nation, colorectal cancer (CRC) is the third commonest cause of cancer related deaths.^[1] Previously published epidemiologic data from Trinidad & Tobago suggested that left-sided lesions were more common, accounting for 73% of all CRC primaries in this nation.^[2] This was published in the year 2017^[2] at a time when there was a global trend for a shift toward right-sided CRC lesions.^[3,4]

More detailed analysis of the publication, revealed that the authors did not use the accepted, standardized definitions for CRC laterality. In international literature,^[5-7] right-sided lesions are those arising in the caecum, ascending colon, hepatic flexure and transverse colon, left-sided lesions are those arising from the splenic flexure, descending and/or sigmoid colon, while rectal cancers are considered separately. This is a very important definition because location of the primary has a significant prognostic effect on response to treatment and cancer related mortality.^[5-7]

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We carried out this study to collect data from patients with CRC in Trinidad & Tobago in order to determine anatomic site using standardized definitions.

METHODS

In Trinidad & Tobago, all legal residents are offered free government-funded health care. In this government-funded healthcare system, all patients with colorectal carcinoma who have biopsies taken at colonoscopy and/or specimens extracted at surgery have their specimens examined at the pathology department of the Port of Spain General Hospital. This facility serves the north-western part of the nation, with a catchment population of approximately 675,000 persons. We secured permission from the institutional review board to retrospectively audit hospital records of patients with CRC who had specimens examined over a 10-year period from January 1, 2011 to January 30, 2021.

In this study, we utilized standardized definitions to classify the laterality of CRC primaries. Right-sided primaries were defined as those that arose in the cecum, ascending colon, hepatic flexure and/or transverse colon.^[5-7] Left-sided primaries were defined as those that originated from the splenic flexure, descending colon and/or sigmoid colon.^[5-7] Rectal lesions were considered separately.

All pathology reports were reviewed and associated data were extracted from, including gender, age and ethnicity. Descriptive statistical analyses were generated with SPSS version 21.0 using the Chi square test of independence to investigate correlations. Independent, continuous variables were compared using the two-tailed Mann-Whitney *U* test for non-parametric groups, with a significance level of 0.05.

RESULTS

Over the study period, there were 470 patients with CRC who had specimens examined at the General Hospital in Port of Spain. Paper based records for 39 patients could not be located and they were excluded from the final analysis. Since this study sought to determine laterality, 100 patients with rectal cancers were also excluded from the final analysis. The final study population comprised 326 patients with CRC.

Using the standardized definitions, there was a predominance of right sided lesions (43%), compared to left-sided (34%) or rectal lesions (23%). Synchronous carcinomas were detected in 5 (1.2%) of patients with CRC, usually as a part of polyposis syndromes.

On subgroup analysis, right sided lesions were present in

182 persons at a mean age of 60.9 years (SD 13.5, range 27–93). In this group, there was a statistically significant preponderance of females, association with black ethnicity and younger age (Table 1).

Left sided lesions were present in 144 patients at a mean age of 65.9 ± 13.64 (range 26–90). There was a slight male preponderance which did not attain statistical significance.

Patient ethnicity was recorded in 153 cases (Table 2). Overall, 77 (50.3%) persons treated for CRC were of Afro-Caribbean ethnicity, 49 (32%) were of Indio-Caribbean ethnicity and 26 (17%) were mixed ethnicity. There was a significant association between Afro-Caribbean ethnicity and right sided CRC and an association between Indio-Caribbean ethnicity and left-sided CRC as outlined in Table 2.

DISCUSSION

This study provides epidemiologic data from patients with CRC in Trinidad & Tobago that will be useful to guide screening programmes. It corrects the previous record suggesting that left-sided disease was more common in this nation. This data is in keeping with international data^[3-5] documenting an increasing prevalence of right-sided CRC.

Caribbean countries have reported similar patterns of right-sided CRC predominance.^[6,8,9-11] The prevalence of right sided lesions in Barbados is 44.3% as reported by Griffith *et al.*^[6] In Jamaica, McFarlane *et al.*^[8] reported right sided lesions in 28.5% and in Martinique, Joachim *et al.*^[9] reported right sided lesions in 26.3% of patients. We found right-sided lesions in 42.7% of Trinidadian patients, which was unexpected as they approximated figures from Barbados, that ranks globally in the top ten nations for CRC incidence.^[1]

The only Caribbean study that suggested a left-sided prevalence was the previously cited study from Trinidad & Tobago^[2] that examined 118 resected specimens. This study was flawed for two reasons: first, the authors assigned rectal primaries as left-sided lesions, contrary to most definitions. They also defined right-sided lesions as those “*found in the ascending colon, including the caecum, and up to the proximal half of the transverse colon*”. It has already been pointed out that this is not the accepted, standardized definition. The definition is important because left and right sided CRC have fundamentally different clinical behaviours.^[7] Right sided lesions have a greater association with microsatellite instability,^[12] and poorer survival statistics.^[13] For this reason, there is consensus on the definition of geographic origin of the primary.^[4-7] The standardized definition of a right-sided

Table 1: Relationship between demographics and colorectal cancer laterality

Parameter	Right-sided colorectal cancer	Left-sided colorectal cancer	P value
Number of patients, n (%)	182 (55.8)	144 (44.2)	0.00288
Age (yr)	60.9 ± 13.5	65.9 ± 13.64	0.00028
Male, n (%)	76 (52.8)	68 (47.2)	0.34722
Female, n (%)	106 (58.2)	76 (41.8)	0.00168

Table 2: Relationship between ethnicity and laterality of colorectal cancer, n (%)

Ethnicity	Right-sided colorectal cancer	Left-sided colorectal cancer	P value
Afro-Caribbean	50/83 (60.2)	27/70 (38.6)	0.00758
Indio-Caribbean	17/83 (20.5)	32/70 (45.7)	0.00086
Mixed ethnicity	16/83 (19.3)	11/70 (15.7)	0.56192

CRC is one that originates in the caecum, ascending colon, hepatic flexure and/or transverse colon, while a left-sided lesion is one that arises from the splenic flexure, descending and/or sigmoid colon.^[4-7] Rectal cancers are not included in the definition of laterality.

The high proportion of Afro-Caribbean patients (50.3%) was notable, since the population in Trinidad & Tobago is equally divided amongst Afro (40%) and Indio-Caribbean (40%) ethnicities.^[14] But it was not unexpected since international data has shown that, compared to other ethnicities, blacks tend to have a higher incidence of CRC,^[15,16] increased association with genetic mutations,^[12,17] and a more aggressive disease course.^[12,17,18]

We also demonstrated that women were statistically more likely to develop right-sided CRCs than males. This pattern is similar to that reported in other countries^[19-22] and it has clinical significance since right-sided CRC have more aggressive behaviour and poorer survival statistics.^[12,19-23]

Our study was limited by the unavailability of immunohistochemical and molecular predictive biomarkers for CRC. It is estimated that genetic factors such as mismatch repair gene mutations and MUTYH genes contribute to CRC incidence in up to one third of patients.^[12] These markers were not universally available for evaluation in the present study.

CONCLUSION

This study collected epidemiologic data from patients with CRC in Trinidad & Tobago. There is a predominance of right-sided CRC in this country, with a significant association with younger, female and black population.

DECLARATIONS

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Author contributions

Shamir O. Cawich, Alyssa Muddeen, and Mikhael Barrow conceptualized the study, collected data and wrote the paper. Kavi Capildeo, Nazreen Bhim, and Shaheeba Barrow performed statistical analysis, contributed to the scientific discussion and checked the manuscript for accuracy. All authors reviewed scientific content for the final manuscript.

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Conflicts of interest

There is no conflict of interest among the authors.

Data sharing statement

No additional data is available.

REFERENCES

- World Cancer Research Fund International. Colorectal cancer statistics. [Accessed Jan 5, 2021] Available from: <https://www.wcrf.org/cancer-trends/colorectal-cancer-statistics/>.
- Rampersad MK, Mohammed SR, Jurawan R. A single centre retrospective review of colorectal cancer in trinidad over a three year period. *Gastroenterol Hepatol Open Access*. 2017;8(1):6-8.
- Gomez D, Dalal Z, Raw E, Roberts C, Lyndon PJ. Anatomical distribution of colorectal cancer over a 10 year period in a district general hospital: is there a true "rightward shift"? *Postgrad Med J*. 2004; 80: 667-669
- Cucino C, Buchner AM, Sonnenberg A. Continued rightward shift of colorectal cancer. *Dis Colon Rectum*. 2002;45:1035-40.
- Mukund K, Syulyukina N, Ramamoorthy S, Subramaniam S. Right and

- left-sided colon cancers - specificity of molecular mechanisms in tumorigenesis and progression. *BMC Cancer*. 2020; 20: 317
6. Griffith S, Padmore G, Phillips E, Ramkissoon SSK, Moore S, Walkes K, Gohar AA, Cawich SO. Colorectal cancer demographics in Barbados. *Med Int (Lond)*. 2021; 1: 2
 7. Baran B, Mert Ozupek N, Yerli Tetik N, Acar E, Bekcioglu O and Baskin Y: Difference between left-sided and right-sided colorectal cancer: A focused review of literature. *Gastroenterol Res*. 2018;11:264-273.
 8. McFarlane ME, Rhoden A, Fletcher PR, Carpenter R. Cancer of the colon and rectum in a Jamaican population: diagnostic implications of the changing frequency and subsite distribution. *West Indian Med J*. 2004; 53: 170-173
 9. Plummer JM, Leake PA, Ferron-Boothe D, Roberts PO, Mitchell DI, McFarlane ME. Colorectal cancer survival in Jamaica. *Ann Med Surg (Lond)*. 2016; 6: 26-29
 10. Joachim C, Veronique-Baudin J, Razanakaivo M, Macni J, Pomier A, Dorival MJ, et al. Trends in colorectal cancer in the Caribbean: A population-based study in Martinique, 1982-2011. *Rev Epidemiol Sante Publique*. 2017;65(3):181-188.
 11. Zbar AP, Inniss M, Prussia PR, Shenoy R. The changing distribution of colorectal cancer in Barbados: 1985-2004. *Dis Colon Rectum*. 2001;50:1215-1222.
 12. Augustus GJ, Ellis NA. Colorectal Cancer Disparity in African Americans: Risk Factors and Carcinogenic Mechanisms. *Am J Patol*. 2018; 188(2):291-303.
 13. Elsaleh H, Joseph D, Grieu F, Zeps N, Spry N, Iacopetta B. Association of tumour site and sex with survival benefit from adjuvant chemotherapy in colorectal cancer. *Lancet*. 2000;355:1745-1750.
 14. Premdas, R. The Peoples of Trinidad and Tobago. Historical and Constitutional Evolution. In: Trinidad and Tobago. Ethnicity, Inequality and Public Sector Governance Series. 2007. Palgrave Macmillan, London.
 15. Simon MS, Thomson CA, Pettijohn E, Kato I, Rodabough RJ, Lane D, Hubbell FA, O'Sullivan MJ, Adams-Campbell L, Mouton CP, et al. Racial differences in colorectal cancer incidence and mortality in the Women's Health Initiative. *Cancer Epidemiol Biomarkers Prev*. 2019;20:1368-1378.
 16. American Cancer Society: Cancer Facts & Figures [Internet]. American Cancer Society, Atlanta, 2019. Available from: <https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2019/cancer-facts-and-figures-2019.pdf>
 17. Staudacher JJ, Yazici C, Bul V, Zeidan J, Khalid A, Xia Y, et al. Increased frequency of KRAS mutations in African Americans Compared with Caucasians in sporadic colorectal cancer. *Clin Transl Gastroenterol*. 2017;8(10):e124.
 18. Simon MS, Thomson CA, Pettijohn E, Kato I, Rodabough RJ, Lane D, et al. Racial differences in colorectal cancer incidence and mortality in the Women's Health Initiative. *Cancer Epidemiol Biomarkers Prev*. 2019; 20(7): 1368-78.
 19. Yang Y, Wang G, He J, Ren S, Wu F, Zhang J and Wang F. Gender differences in colorectal cancer survival: A meta-analysis. *Int J Cancer*. 2017;141:1942-1949.
 20. Press OA, Zhang W, Gordon MA, Yang D, Lurje G, Iqbal S, El-Khoueiry A, Lenz HJ. Gender-related survival differences associated with EGFR polymorphisms in metastatic colon cancer. *Cancer Res*. 2008;68:3037-3042.
 21. Hansen IO and Jess PM. Possible better long-term survival in left versus right-sided colon cancer-a systematic review. *Dan Med J*. 2012;59:A4444.
 22. Elsaleh H, Joseph D, Grieu F, Zeps N, Spry N, Iacopetta B. Association of tumour site and sex with survival benefit from adjuvant chemotherapy in colorectal cancer. *Lancet*. 2000;355:1745-1750.
 23. Kim SE, Paik HY, Yoon H, Lee JE, Kim N, Sung MK. Sex and gender-specific disparities in colorectal cancer risk. *World J Gastroenterol*. 2015;21:5167-5175.