

Association between known risk factors and colorectal cancer risk in Indigenous people participating in the Ontario Familial Colon Cancer Registry

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ABSTRACT

Introduction Colorectal cancer is one of the most common cancers in Ontario and imposes a high burden on many Indigenous populations. There are two aims for this short communication:

- Highlight colorectal risk factor findings from a population-based case-control study
- Highlight trends and challenges of colorectal cancer research in Indigenous populations in Ontario

Methods Prevalences of cigarette smoking, obesity, fruit and vegetable consumption, and family history of colorectal cancer were estimated using the Indigenous identifier in the Ontario Familial Colon Cancer Registry for 1999–2007 and then compared for cases and controls using age-adjusted odds ratios (ORs) with 95% confidence intervals (CIs).

Results The registry search identified 66 Indigenous cases and 23 Indigenous controls. Cigarette smoking (OR: 1.88; 95% CI: 0.63 to 5.60) and obesity (OR: 2.16; 95% CI: 0.72 to 6.46) were higher in cases, but not statistically significantly so.

Conclusions Findings were consistent with previous literature describing Indigenous populations. A small sample size and poor Indigenous identification questions make it challenging to comprehensively understand cancer risk factors and burden in Indigenous populations.

Key Words Indigenous health, cancer prevention

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INTRODUCTION

Colorectal cancer (CRC) is the 2nd most commonly diagnosed cancer and the 2nd leading cause of cancer death in Ontario¹. Lack of ethnic identifiers in Ontario health databases make it challenging to capture cancer burden, risk factors, or screening information for Indigenous populations. The Indigenous populations in Canada consist of 3 groups: First Nations, Inuit, and Métis. In Ontario, the First Nations group constitutes the greatest proportion, representing 63% of the Indigenous population in the province². The incidence of CRC is significantly higher in First Nations people in Ontario and has shown a gradual upward trend from 1991 to 2010, while rates in the general provincial population have stabilized³. Mortality from CRC

is higher and 5-year survival is poorer for First Nations people compared with other people in Ontario³. First Nations people in British Columbia and nationally also have a higher burden of CRC compared with their non-Indigenous counterparts^{4,5}. Little is known about the CRC burden in Inuit and Métis populations in Ontario; however, limited national data show a higher incidence of CRC in Inuit compared with other populations^{6,7}. Conversely, Métis people in Canada, particularly Métis women, have a lower incidence of CRC⁸.

The higher burden of CRC for many Indigenous populations might be attributable to higher prevalences of established risk factors associated with cancer and other chronic conditions⁹. In particular, higher prevalences of cigarette smoking, binge drinking, and obesity have been

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observed in First Nations and Inuit populations than in non-Indigenous populations^{10–12}.

This short communication has two objectives:

- To briefly highlight the Indigenous findings from an Ontario population-based case–control study and the factors that might contribute to the alarming increase in CRC occurring in Indigenous people in Ontario
- To discuss the challenges of CRC research in Indigenous populations

METHODS

A subset of data collected by the Ontario Familial Colon Cancer Registry (OFCCR) between 1999 and 2007 was used to examine CRC risk factors in Indigenous people.

The OFCCR is a multi-phase case–control study that identified incident cases of CRC in the population-based Ontario Cancer Registry and an age-group-matched control population. The matching did not consider ethnicity, because that variable was obtained after participation. The invitation package sent to cases and controls included a self-administered questionnaire asking about demographics and known CRC risk factors before the cancer diagnosis date (or a referent date for controls). Control participants were identified by randomly selecting households based on a telephone listing. Details about the recruitment of case and control participants, including data collection methods used by the OFCCR for phase 1 (1997–2000) can be found in Cotterchio *et al.*¹³. The Research Ethics Board of the University of Toronto approved this secondary data analysis of the OFCCR.

Indigenous Identifier

Respondents self-identified as Indigenous in the questionnaire. The ethnicity identification question included an option for “First Nations (e.g. Indian, Inuit).” Persons participating in the OFCCR and identifying as any other ethnicity were excluded from the present analyses. It is important to note that most respondents in this survey identified as First Nations, but are referred to as “Indigenous,” given the wording of the question.

Statistical Analysis

Prevalence estimates for demographics and risk factors were calculated for Indigenous case and control participants. Variables assessed included cigarette smoking (having ever smoked cigarettes for 3 months or longer), body mass index (obesity), fruit and vegetable consumption (at least 5 servings of fruit or vegetables daily), and family history of CRC (first-degree relative). Age-adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were also calculated for those risk factors using age at diagnosis for case participants and age at survey for control participants. Statistical significance was determined by overlapping of CIs.

RESULTS

Table 1 shows the demographics, prevalence estimates, and age-adjusted ORs for several risk factors for Indigenous case and control participants. For 1999–2007, 66 Indigenous case participants with CRC and 23 Indigenous control participants were located in the OFCCR. Higher prevalences of smoking cigarettes (OR: 1.88; 95% CI: 0.63 to 5.60) and

TABLE 1 Colorectal cancer case–control comparison for Indigenous individuals

Indicator	Cases	Controls	Age-adjusted	
			OR	95% CI
Patients (<i>n</i>)	66	23		
Sex [<i>n</i> (%)]				
Men	31 (47)	11 (48)		
women	35 (53)	12 (52)		
Age group [<i>n</i> (%)]				
≤50 Years	30 (45)	6 (26)		
>50 Years	36 (55)	17 (74)		
Education [<i>n</i> (%)]				
High school or less	37 (56)	10 (43)	1	
College (at least some)	21 (32)	12 (52)	0.496	0.065 to 3.764
Graduate	3 (5)	1 (4)	0.401	0.135 to 1.189
Positive family history	18 (27)	2 (13)	4.678	0.946 to 23.120
Ever smoked cigarettes ^a	46 (70)	15 (65)	1.881	0.632 to 5.60
Body mass index ^b				
<25	19 (29)	9 (40)	1	
≥25	47 (71)	14 (63)	2.158	0.721 to 6.457
Fruit and vegetable consumption ^c	15 (23)	6 (26)	1.369	0.436 to 4.292

^a For 3 months or more.

^b In kg/m², 2 years preceding the study.

^c At least 5 servings daily.

OR = odds ratio; CI = confidence interval.

being overweight or obese (OR: 2.16; 95% CI: 0.72 to 6.46) were observed for case participants compared with control participants. In both groups, the proportion of individuals consuming at least 5 vegetables or fruits daily was similar.

For more than a quarter (27%) of Indigenous case participants, at least 1 first-degree relative had a history of CRC; among Indigenous control participants, the proportion was only 13% (OR: 4.67; 96% CI: 0.94 to 23.12).

DISCUSSION

The study findings suggest higher prevalences of smoking, obesity, and family history of CRC in Indigenous case participants than in Indigenous control participants; however, the results are not statistically significant. Although our study has a small sample size, findings are consistent with other literature. Previous studies have also shown significantly higher prevalences of smoking and obesity in Indigenous populations in Canada, the United States (Alaska), Australia, and New Zealand^{9,11,12,14–17}. Specifically in Ontario, one study found that, compared with non-Aboriginal people, off-reserve First Nations and Métis men were about twice as likely to be smokers, and First Nations women were 3.5 times and Métis women were 2.5 times as likely to be smokers. Compared with non-Aboriginal people, First Nations and Métis people were also twice as likely to be obese⁹. Sample size to estimate the smoking prevalence in Ontario Inuit is too small; however, in Inuit Nunangat (Inuit homelands), almost two thirds of the Indigenous population were smokers compared with only 23% of non-Aboriginal adults¹¹.

Findings from previous OFCCR analyses encompassing all Ontario participants reported that approximately 60% of case and control participants have smoked cigarettes, compared with the 65%–75% of Indigenous case and control participants in the present study using the OFCCR¹⁸. That observation suggests that, compared with the general Ontario OFCCR population, a slightly higher absolute proportion of Indigenous people in the OFCCR smoke. Although the Cotterchio *et al.*¹⁸ OFCCR findings for the general population covered 1997–2002, compared with the present Indigenous OFCCR analysis, which covers 1999–2007, there was some overlap.

Given the alarming increase in the CRC incidence in First Nations and Inuit populations, a priority must be placed on mitigating risk factors and increasing CRC screening uptake^{3,5,6,19}. Data about CRC screening are limited. Although the OFCCR questionnaire contained questions about screening by fecal occult blood test and colonoscopy, the sample size was too small to report findings (a large group was missing). In Ontario, the organized CRC screening program for people more than 50 years of age was not developed until 2007, after recruitment for the present study. It is therefore likely that many respondents might not have been participating in CRC screening.

A previous self-reported survey from 2007–2011 found that about half the respondents (First Nations, Métis, and non-Aboriginals) were overdue for CRC screening (that is, had not participated in fecal occult blood testing in the preceding 2 years or in colonoscopy or sigmoidoscopy in the preceding 10 years)⁹. Similarly, more than two thirds of Inuit

adults living in Inuit Nunangat were overdue for CRC screening¹¹. Previous publications have found a higher CRC incidence in First Nations people less than 50 years of age than in non-First Nations people^{3,5}. In Ontario, the CRC screening guidelines suggest screening every 2 years for adults 50–74 years. However, if evidence suggests an earlier age of onset in First Nations people, screening guidelines might have to be reconsidered for that population, as has been done for African Americans and Alaska Natives by some organizations in the United States^{20,21}. More investigation into age at diagnosis and screening guideline changes is needed.

Future Work

For years, Ontarians have been volunteering in a longitudinal cohort study called the Ontario Health Study. To date, about 5000 participants have self-identified as Aboriginal, representing 2% of the entire provincial sample. The study aims to understand modifiable and genetic risk factors associated with many health conditions, including cancer, and therefore represents a unique opportunity to examine the research questions posed earlier in this paper, while addressing many of the limitations described in next subsection.

Strengths and Limitations

Although this case-control study of Indigenous participants in the OFCCR had a small sample size, findings were consistent with the previous literature.

Given the small sample size, one limitation is the lack of ability to report on other risk factors and screening behaviours relevant to CRC. Another limitation of the OFCCR for Indigenous findings includes the poor ethnic identification question. Given that the original OFCCR survey questions were developed in 1997, the question incorrectly grouped First Nations and Inuit and excluded Métis. Historically, surveys have had poor ethnic identification for Indigenous populations, with surveys often grouping all 3 populations under a pan-Aboriginal or pan-Indigenous category. That misidentification weakens the survey findings. Additionally, some surveys—the Canadian Community Health Survey, for instance—capture only the off-reserve First Nations population, missing almost 50% of First Nations in Ontario who live on reserve²². The lack of ethnic identifiers in health databases, paired with poor ethnic identification questions, makes it challenging to gather information about cancer risk factors and surveillance in Indigenous populations. It also often leads to underestimation of cancer cases or risk factors, especially if self-report of identity is being relied on²³.

CONCLUSIONS

Overall, information about cancer risk factors and screening behaviours among Indigenous people, particularly Métis and Inuit, in Ontario is limited. More research into follow-up from cancer screening and abnormal tests in all 3 groups is needed.

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CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology's* policy on disclosing conflicts of interest, and we declare that we have none.

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