American Journal of Gastroenterology
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Published by Blackwell Publishing

ISSN 0002-9270
doi: 10.1111/j.1572-0241.2006.00603.x

The Epidemiology of Inflammatory Bowel Disease in Canada: A Population-Based Study

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BACKGROUND: **Previously, we have demonstrated a high incidence and prevalence of Crohn's disease (CD) and ulcerative colitis (UC) in the Canadian province of Manitoba. However, the epidemiology of inflammatory bowel disease (IBD) in other regions of Canada has not been defined. The aim of this study was to estimate the incidence and prevalence of CD and UC in diverse regions of Canada and the overall burden of IBD in Canada.**

METHODS: **We applied a common case identification algorithm, previously validated in Manitoba to the provincial health databases in British Columbia (BC), Alberta (AB), Saskatchewan (SK), Manitoba (MB), and Nova Scotia (NS) to determine the age-adjusted incidence rates per 100,000 person-years for 1998–2000 and prevalence per 100,000 for mid 2000 and to estimate the IBD burden in Canada. Poisson regression was used to assess differences in incidence rates and prevalence by gender, age, and province.**

RESULTS: **The incidence rate for CD ranged from 8.8 (BC) to 20.2 (NS), and for UC ranged from 9.9 (BC) to 19.5 (NS). The prevalence of CD was approximately 15- to 20-fold higher than the incidence rate, ranging from 161 (BC) to 319 (NS). This was similar for the prevalence of UC, which ranged from 162 (BC) to 249 (MB). Adjusting for age and province, the female:male ratio for incidence ratio was 1.31 ($p < 0.0001$) for CD and 1.02 (n.s.) for UC and was mostly stable across the five provinces.**

CONCLUSIONS: **Approximately 0.5% of the Canadian population has IBD. Canada has the highest incidence and prevalence of CD yet reported.**

(Am J Gastroenterol 2006;101:1559–1568)

INTRODUCTION

Describing the epidemiology of inflammatory bowel disease (IBD) is important for appreciating the public health burden it causes and for planning appropriate health services for persons with IBD (1–3). Moreover, careful descriptive epidemiological studies will offer clues to the etiology of these diseases.

IBD has become increasingly diagnosed and managed in outpatient clinics. Hence, population-based studies that capture all health system contacts are much more likely to reflect the true disease burden as opposed to studies conducted from hospitals or even those that restrict themselves to gastroenterology clinics. A number of population-based studies have been published from both Europe and North America (4, 5). These studies have identified trends in disease incidence that have regional implications but may not be applicable broadly in other countries. As population-based data emerged mostly from Europe through the 1960s to the 1990s, it was suggested that there was a North-South gradient with higher rates in northern countries (4, 5), or even within the United States higher rates in northern states *versus* southern states (6). In the absence of population-based data from such developed nations as Australia or South Africa, it was difficult to know if this reflected a difference between the developed nations in northern Europe and North America and developing nations of Asia, Africa, and South America or if this truly reflected an aspect of environmental influences from northern jurisdictions. A North-South gradient was recently reported for

the incidence of juvenile-onset Crohn's disease (CD) in Scotland (7). A North-South gradient has even been proposed for prevalence of genetic mutations with lower rates of the known CD related mutations in the northern populations of Norway, Finland, and Ireland compared with a population from Germany (8). More recently the reality of a North-South incidence gradient has been questioned with emerging data from southern Europe (9).

Little is known about regional differences in the occurrence of IBD in North America. In 1999 a population-based study from Manitoba reported an incidence rate and prevalence of CD for the years 1989–1994 of 14.6/100,000 person-years and 197/100,000 (in 1994), respectively, both the highest rates to be reported anywhere for this disease (1). Manitoba is approximately 450 miles north of Olmsted County, Minnesota where for CD an average incidence rate of 6.9/100,000 in 1984–1993 and a prevalence of 144/100,000 was reported for 1991 (10). It remained unknown as to how representative either of these data sets was of their respective countries. The incidence rates and prevalence for ulcerative colitis (UC) were 14.5/100,000 person-years and 167/100,000, respectively, in Manitoba and in 1984–1993 the average incidence rate was 8.3/100,000 and prevalence was 229/100,000 in 1991 in Olmsted County (11).

Hence, to develop a greater understanding of the epidemiology of these diseases in Canada, we aimed to develop a larger database of both CD and UC across the participating Canadian provinces by using the administrative definition developed in Manitoba for IBD (1). Herein, we report the incidence and prevalence of CD and UC by age, sex, and region in the five Canadian provinces of British Columbia (BC), Alberta (AB), Saskatchewan (SK), Manitoba (MB), and Nova Scotia (NS) and thereby estimate the burden of IBD in Canada.

METHODS

The Construction of the University of Manitoba IBD Epidemiology Database

Beginning in 1995 we established the first, and only, population-based database of IBD in Canada, and by far the largest in North America (1, 12). Our group devised a strategy to use the Manitoba Health's administrative database to accurately identify persons with IBD from 1984 to 1995. To identify persons with IBD, physician billing claims and hospital discharge abstracts were searched for the diagnosis of CD (ICD-9-CM code 555.xx) or UC (ICD-9-CM code 556.xx) between the years 1984 and 1995, inclusive. Those with only one or two claims between the years 1984 and 1993 were excluded to enhance the specificity, although this knowingly may have sacrificed some sensitivity. All those with three or more claims prior to 1993 or any claims from 1993 onward were sent questionnaires with consent forms in the mail. Using self-reports from 2,700 persons who returned the questionnaires and a structured review of 448 randomly selected clinical charts as "gold standards," we then developed a case definition algorithm based on the number and periodicity of health-care contacts that minimized the proportion of false-positive cases, while retaining a high sensitivity of identifying true cases. This case definition included having at least five health system contacts (a contact can be either a unique outpatient visit or hospitalization) or, if the individual was registered in the health system for less than 2 yr, having three or more contacts. We found that this case definition had a sensitivity of 90% for identifying true IBD cases, while having a false-positive rate of 10% within the sample who had at least one health-care contact for IBD. Since all those in the province (approximately 1.1 million) without an IBD health-care contact were automatically categorized as non-IBD, the overall false-positive rate is therefore less than 0.025%. Applying this case definition to all Manitoba Health administrative databases, we subsequently have established an anonymous database of all IBD patients within MB (the University of Manitoba IBD Epidemiology Database).

Development of the Canadian IBD Epidemiology Database

We applied the validated administrative definition of IBD from MB to the other provincial health registries in BC, AB, SK, and NS. The study included these provinces because there were coinvestigators who were interested in participating in the study and were able to facilitate access to the necessary data from their provincial health administrative databases. Potential coinvestigators from other provinces were approached but were unable to collaborate. The participating provinces together with MB provide a diverse sampling of Canadians, covering each coast and the center of the country. In each province, the provincial health databases were searched for the health-care utilization records of each individual with a health-care contact for a diagnosis of CD (ICD-9-CM 555.x) or UC (556.x). In SK, ICD-9 was used and not ICD-9-CM; however, they are the same at the three digit level. The IBD-related health-care utilization patterns for individuals were then analyzed by a unique anonymous study identifier, or scrambled health number. The common administrative case definition was then applied to identify IBD cases. For subjects who have both ICD-9-CM 555 and 556 contacts the majority of the last nine contacts was designated as the diagnosis. For each case age, gender, and geographic location were recorded. Therefore, each province developed its own administrative database analogous to what already exists in Manitoba. The date of first medical contact was considered to be the "diagnosis date" for estimating the incidence rates. Each provincial data set was aggregated and sent to the central study center in Winnipeg, where the interprovincial data were analyzed.

We determined the distribution of cases as rural *versus* urban for each province by using the Canada Post rural-urban designation, which is the second field in the postal code.

Data from each province were available for the following years: BC 1990–2001, AB 1985–2002, SK 1985–2002, MB

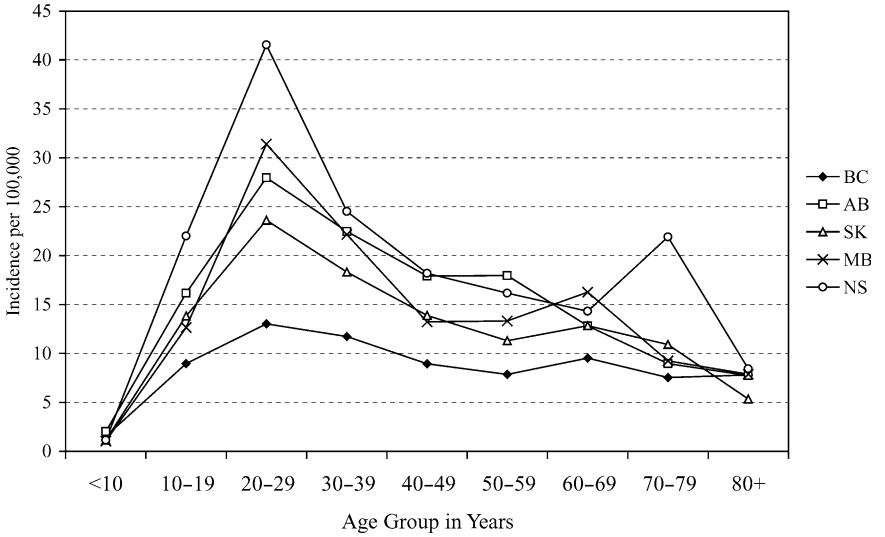

Figure 1. Age-specific incidence per 100,000 of Crohn's disease in five Canadian provinces, 1998–2000.

1984–2002, and NS 1989–2001. (In NS the data that could be applied to the case definition were available since 1989, but population registry data that facilitate rate calculation became available in 1996.) There were at least 8 yr of data available in each province prior to the year (1998) we used to begin calculating incidence rates. Owing to the possibility that there might have been incomplete data for the last year of data collection in each province and to the fact that sufficient lead time was required to differentiate incident from prevalent cases (and that in NS the rural/urban indicator was first available in 1997), we determined incidence rates for the years 1998–2000 and all prevalence estimates were reported as of July 1, 2000.

Analyses

To conduct cross-provincial analyses and comparisons, standardized aggregated data sets were created in each of the participating centers and then collated and analyzed by a senior analyst with the University of Manitoba (AW). Provincial populations were aggregated according to the demographic variables by year. We calculated the average age-adjusted incidence rates of CD and UC for the years of 1998, 1999, and 2000 by summing the incident cases and estimating the person-years by summing the mid-year populations for those 3 yr. The point prevalence estimates were made for July 1, 2000 by calculating the number of persons living with CD and UC and dividing by the estimated total population on that date. Incidence rate is reported per 100,000 person-years and prevalence estimates are reported per 100,000. We determined the peak ages of incidence and prevalence of each of CD and UC and the gender distribution for each of CD and UC. Pediatric incidence rates for 1998–2000 were calculated for those less than 20 yr of age at time of diagnosis. Pediatric prevalence is reported for July 1, 2000. Poisson regression was used to assess differences in incidence and prevalence by gender, age, and geographic location (urban/rural and province of residence), mutually adjusting for each of these factors in a multivariate model. For both urban *versus* rural ratios and female *versus* male ratios the ratios are based on annual incidence rates. These ratios were calculated for each province and for all five provinces combined. Since the administrative data in BC were not suitable for accurately distinguishing between urban and rural residents, data from that province were excluded in the urban/rural analyses. Because BC proved to be an outlier, particularly for CD, and because its population ethnic make-up is somewhat different from the rest of Canada, overall incidence rates and prevalence are

Table 1. Incidence, Prevalence, and Sex and Urban/Rural Incidence Rate Ratios (IRR) for Crohn's Disease in Five Canadian Provinces: 1998–2000.

Province	Incidence Rate* (per 100,000)	Prevalence* (per 100,000)	Female:Male* IRR	Urban:Rural* IRR
Nova Scotia	20.2	318.5	1.44	0.85
Manitoba	15.4	271.4	1.53	1.52
Saskatchewan	13.5	263.8	1.48	1.08
Alberta	16.5	283.0	1.26	1.13
BC	8.8	160.7	1.23	NA
Total	13.4	233.7	1.33	1.05
Total (without BC)	16.3	279.2	–	–

*Directly adjusted to the total population of the five provinces.

Table 2. Pediatric Incidence Rates (mean per 100,000 for 1998–2000) and Prevalence (July 1, 2000)

	AB	BC	MB	NS	SK
CD					
Incidence rate (per 100,000)	9.4	5.4*	6.9	12.0*	7.9
Prevalence (per 100,000)	71.1*	35.8	30.5	47.3*	32.2
UC					
Incidence rate (per 100,000)	4.1	3.2	4.5	5.7	4.2
Prevalence (per 100,000)	30.7*	17.5	18.8	26.7*	18.1

*Significantly different at $p < 0.01$.

extrapolated to the rest of Canada including and excluding BC data.

RESULTS

Crohn's Disease

The overall peak incidence was between the ages 20 and 29 yr in all provinces (Fig. 1). The incidence rate was similar in the three prairie provinces of AB (16.5), SK (13.5), and MB (15.4), but highest in AB ($p = 0.055$ for MB *vs.* SK, and $p < 0.001$ for AB *vs.* SK) (Table 1). However, the average incidence rate was substantially lower in BC (8.8) and somewhat higher in NS (20.2) ($p < 0.0001$ for the differences). The overall incidence rate across Canada was 13.4, and excluding BC data were 16.3. The regional differences were maintained by sex, age group, and urban/rural residence.

The incidence rate of CD for children less than 20 yr of age was highest for NS (12.0, $p = 0.007$ compared to the overall average), and lowest for BC (5.4, $p = 0.009$ compared to the overall average) (Table 2). There was a similar incidence rate among girls (8.0) compared with boys (7.5, $p =$ n.s.). The prevalence of pediatric CD was highest in AB (71.1, $p < 0.0001$) and lowest in MB (30.5, $p = 0.11$). Notably there was a higher prevalence rate among boys (49.6) compared with girls (43.8, $p = 0.0001$).

Women in all provinces have a higher incidence rate by a factor of 1.23–1.53 (overall ratio 1.33). After adjusting for age and location of residence, the overall adjusted female:male incidence ratio (IR) was 1.31 (95% CI 1.23–1.40, $p < 0.0001$). In MB, there was a somewhat higher incidence of CD among urban dwellers (IR 1.52, $p < 0.0001$), whereas there was slightly high urban IR in AB (IR ratio 1.13, $p = 0.06$) and SK (IR ratio 1.08, n.s.), and a slightly lower rate in urban areas in NS (IR ratio 0.85, $p = 0.02$). The overall urban:rural IR ratio, adjusted for age, gender, and province was 1.05 ($p = 0.25$).

The peak age of prevalence was 30–39 yr without a second peak in later years, as has been reported in the past (Fig. 2). The prevalence on July 1, 2000 was BC (161), AB (283), SK (264), MB (271), and NS (319) (Table 1). The overall estimated prevalence in Canada was 234 and excluding data from BC was 279.

UC

There was no single peak age of incidence across the provinces (Fig. 3). The initial peak was at 20–29 yr in all provinces followed by a plateauing and then possibly a second peak in later years in all provinces except SK. The incidence rates were BC (9.9), AB (11.0), SK (10.4), MB (15.4), and NS (19.5) (Table 3) with significant differences between MB and NS and the other three provinces ($p < 0.0001$ for each). The overall estimated incidence rate in Canada was 11.8.

The incidence rate of UC for children less than 20 yr of age was highest for NS (5.7, $p = 0.15$), and lowest for BC (3.2, $p = 0.17$) (Table 2). The incidence rate for girls (4.37) was higher than for boys (3.58, $p = 0.07$). The prevalence of pediatric UC was highest in AB (30.7, $p < 0.0001$) and lowest, but not significantly different, in BC (17.5, $p = 0.67$). The prevalence trended to be higher among girls (24.3) compared to boys (21.1, $p = 0.0027$).

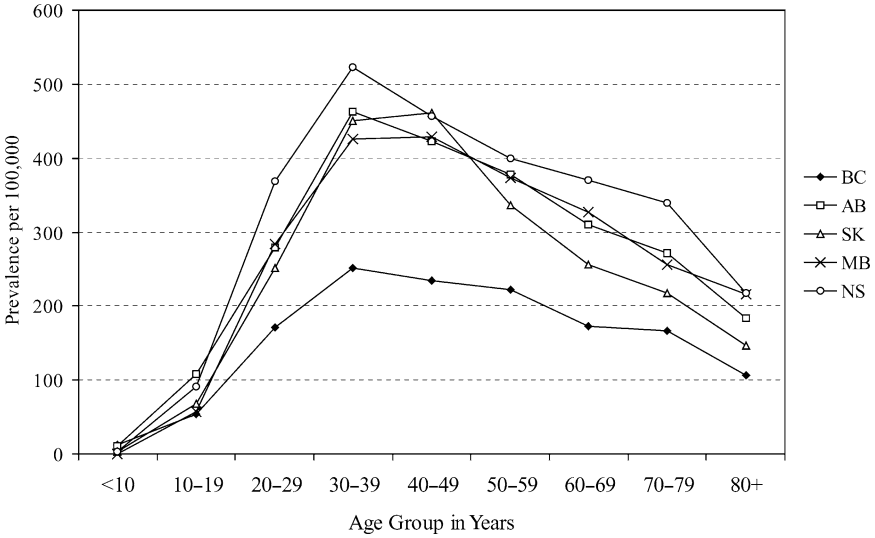

Figure 2. Age-specific prevalence per 100,000 of Crohn's disease in five Canadian provinces, 2000.

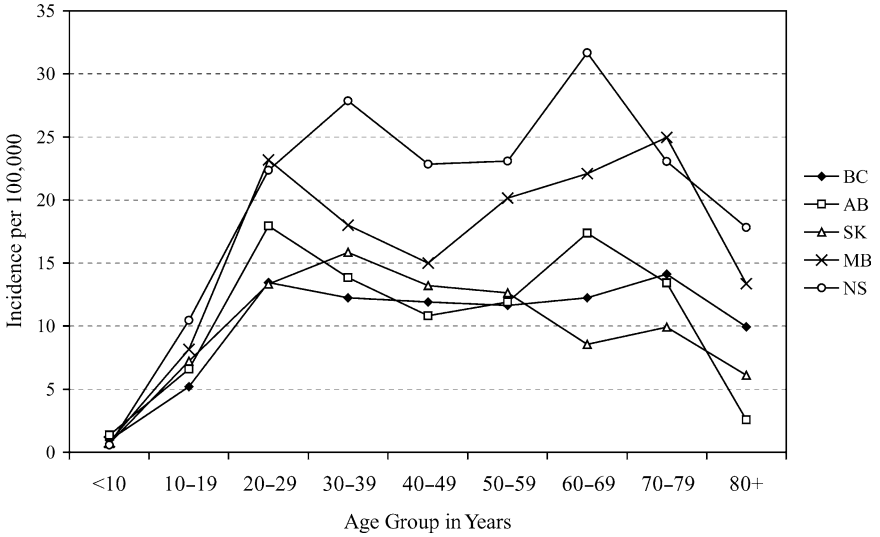

Figure 3. Age-specific incidence per 100,000 of UC in five Canadian provinces, 1998–2000.

The IR was similar between women and men, with the female:male ratio only significant in MB ($p = 0.02$). Urban and rural dwellers had similar incidence rates in SK (IR 1.01, n.s.), whereas it was higher in urban dwellers in AB (IR ratio 1.44, $p < 0.0001$) and MB (IR ratio 1.53, $p < 0.0001$), and lower in urban dwellers in NS (IR ratio 0.84, $p = 0.04$). The urban:rural ratio was similar between CD and UC in all provinces. After adjustment for age, gender, and province of residence the overall urban:rural IR ratio for UC was 1.13 ($p = 0.01$).

There was no peak age of prevalence across the provinces but the prevalence generally began to rise at around the age of 30 yr (Fig. 4). The prevalence on July 1, 2000 was: BC (162), AB (185), SK (234), MB (249), and NS (248) (Table 3). The overall estimated prevalence of UC in Canada was 194, and excluding BC data was 211.

Figure 5 presents age-specific incidence rates for CD and UC by gender.

In 2000 the population of Canada was 30,750,087. Extrapolating these data to the entire country by using data from AB, SK, MB, and NS to extrapolate to Canada without BC and then adding BC, the number of incident cases in Canada in 2000 was approximately 4,600 CD and 3,500 UC and in total there were approximately 81,000 persons with CD and 63,000 persons with UC.

DISCUSSION

It is important to understand the context of our data from Canada in terms of the world epidemiology of these diseases. The data for CD are as follows: the incidence rates in Northern Europe have varied between 1.6 and 11.6/100,000 person-years with prevalence estimates of 27–48/100,000 (13–26). There was a trend toward higher rates in the later years of most studies, but incidence rates in general have remained less than that seen with UC. Incidence rates for southern areas, including Spain, Italy, Cuba, and South America, are <1.0/100,000 person-years (20, 26), and from central Israel 1.3/100,000 person-years (27). The most recent Scandinavian data are from Norway, which revealed an incidence rate of 5.8/100,000 person-years for the years 1990–1993 (28).

The most recent CD incidence data from Olmsted County revealed a rate that was 6.9/100,000 person-years in the years 1984–1993, whereas the prevalence in 1991 was 144/100,000 (10, 29). Data from the recent U.S. Medicare and Veterans' studies show an increased prevalence in the northern United

Table 3. Incidence, Prevalence, and Sex and Urban/Rural Incidence Rate Ratios (IRR) for Ulcerative Colitis in Five Canadian Provinces: 1998–2000

Province	Incidence Rate* (per 100,000)	Prevalence* (per 100,000)	Female:Male* IRR	Urban:Rural* IRR
Nova Scotia	19.2	247.9	1.03	0.84
Manitoba	15.4	248.6	1.21	1.53
Saskatchewan	10.4	234.3	0.98	1.01
Alberta	11.0	185.0	0.99	1.44
BC	9.9	162.1	1.05	NA
Total	11.8	193.7	1.05	1.13
Total (without BC)	12.9	211.2	–	–

*Directly adjusted to the total population of the five provinces.

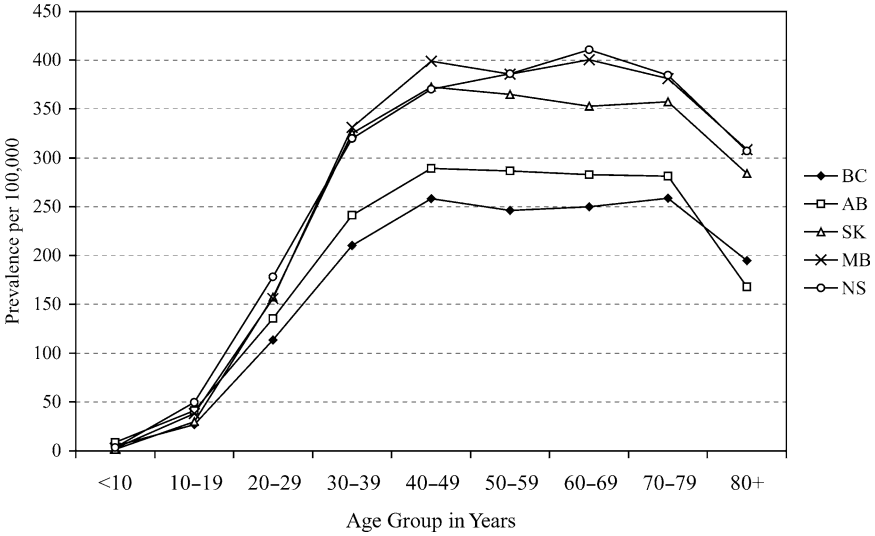

Figure 4. Age-specific prevalence per 100,000 of UC in five Canadian provinces.

States compared with southern United States for Crohn's disease (6, 30). Notably, the lowest rate among the 15 states was in Minnesota, which somewhat corroborates the much lower rate in Olmsted County than in MB, which is a neighboring Canadian province.

In MB the incidence rate was 15/100,000 person-years in 1990–1994 and the prevalence of CD in 1994 was 198/100,000 (1). It should be noted that the high specificity in the case definition likely underestimates both incidence and prevalence in MB and across the other provinces. Discharge rates for Crohn's disease from hospitals across Canada between 1971 and 1989 nearly tripled from 9 to 25/100,000 in men and from 12 to 36/100,000 in women (31). Since there would have been a move toward more outpatient diagnoses of CD during those years these data likely reflect a true increase and perhaps a tripling of CD incidence rates over that period.

The data for UC are as follows: the incidence of UC in Northern Europe from the 1970s and onward has ranged from 6.3 to 15.1/100,000 person-years (13–15, 32–39). The estimated prevalence in Northern Europe ranges from 58 to 157/100,000 (14, 37). The most recent Scandinavian data (from Norway) revealed an incidence rate of 13.6/100,000 for the years 1990–1993 (39). Incidence rates in more southern areas have been much lower, closer to 1.5–5.8/100,000 (40–44).

The UC incidence rates remained stable throughout the 1980s up until 1993 in Olmsted County (45). The reported prevalence in 1991 was 229/100,000 (11). Data from the early 1990s in MB revealed an incidence rate in 1990–1994 of 14.5/100,000 person-years and a prevalence in 1994 of 167/100,000 (1). The incidence rate was much higher in MB than that in Olmsted County, Minnesota. It is interesting to

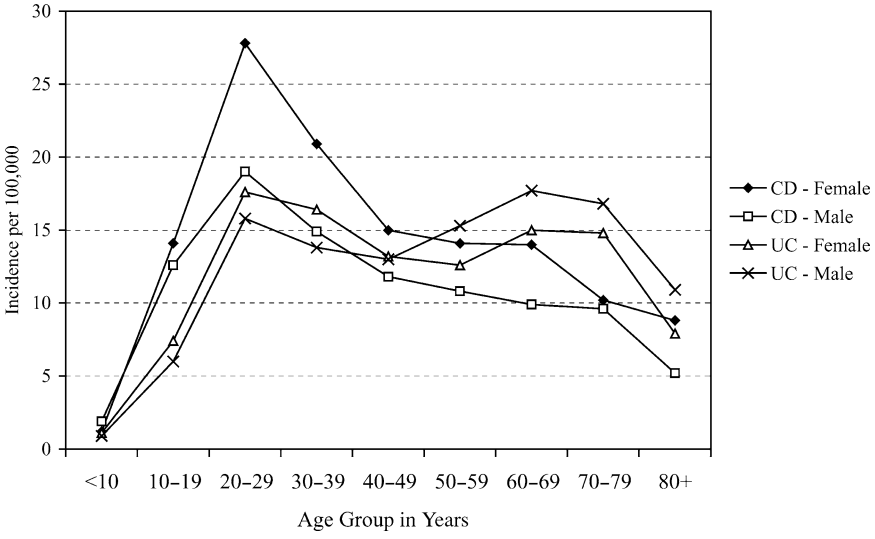

Figure 5. Age-specific incidence rates (per 100,000) of Crohn's disease (CD) and ulcerative colitis (UC) in five Canadian provinces, 1998–2000.

note that the prevalence in Olmsted County in the 1990s was not different from that in 1979, suggesting that UC incidence had either stabilized or started to decline before 1979. Hospitalization data from U.S. Medicare discharge data and from a group of U.S. Veterans' hospitals (6, 30) have both suggested a higher prevalence of UC in the northern United States compared with the southern United States.

The higher incidence rates of CD than UC in our study have also been observed in some other recent European studies including from northern France (46), Sweden (47), and Scotland (7), and in a recent pediatric study from Wisconsin (48).

Recently, we have reported on the IBD hospitalization rates and trends across Canada (49). While this study would have captured only the most ill IBD patients, since most remain outpatients, it did provide an ability to assess relative burden of disease across the country. In this study, AB, SK, and MB had close to the national averages for the years of our study. However, BC had hospitalization rates that were lower than the national average (70% of the average) and NS and the other Maritime provinces all had hospitalization rates that were significantly higher than the national average. These regional variations in hospitalization rates, therefore, mirror the incidence and prevalence estimates from the present study.

While we might have considered that physicians in BC simply undercode for CD and UC, leaving less subjects with these diagnoses discerned, the BC hospitalization data support the notion of lower rates in BC than elsewhere. Similarly, NS had higher hospitalizations rates than the other provinces. This corroboration lends confidence toward extrapolating our data across Canada, including accounting for BC's low rates. Note that in this study we have included both outpatient visits and hospitalizations, and outpatient visits far outnumber hospitalizations. Perhaps BC's low incidence and prevalence rates support the notion that an immigrant population usually does not acquire the disease. Much of BC's immigration in the past 20 yr has been from Asia, and Asians are known to have less IBD than Caucasians. Approximately 22% of the population of BC is a visible minority. The incidence in non-White populations is reportedly significantly lower than in Whites. This is true of the Maoris in New Zealand (50), the Japanese (51), and possibly in the Black and Native American Indian populations of the United States (52, 53). A study from a large Health Maintenance Organization in California revealed that the hospitalization rate for IBD in the Black population was comparable to the rate seen in Whites (54). In this study there was a much lower rate of hospitalization for IBD in the Hispanic and Asian populations. In Leicestershire, UK, Indian immigrants had lower rates of CD than native Englanders; however, the first-generation offspring of the immigrants born in the UK had rates similar to the native England population (55). In fact, the incidence of UC among second-generation South Asian migrants was significantly higher than that among native Europeans by a factor of nearly 2.5-fold (56). A recent pediatric survey of the UK and Ireland reported a greater proportion of Asian children with UC than other ethnic groups (relative risk 1.5, 95% CI 1.1, 2.2, $p = 0.03$) (57). It will be important to track the trend of incidence of IBD to determine if higher rates will be evident in BC in the coming years. It will also be of interest to determine whether the low rates evident among MB's First Nations population (12) increase over time as more move to the urban centers from their rural communities.

Since the populations of MB and SK include approximately 10% First Nations, and their rates of IBD are significantly higher than BC, even accounting for the percentage of visible minorities in BC, their rates, particularly for CD, are still well below the other provinces. Alternatively then, the lower rates in BC may not represent an ethnic or genetic factor but rather an environmental one. As discussed above, if there is a "North-South" gradient to IBD incidence this may represent a climatic or environmental issue and while the climates across AB, SK, and MB are similar, the climate of BC is dissimilar, with milder temperatures and more precipitation. BC borders the Pacific Ocean, while NS borders the Atlantic Ocean and has higher rates.

Our study has reaffirmed the importance of assessing the epidemiology of IBD in the context of geography. To date the only population-based North American data of IBD epidemiology came from MB and Olmsted County, Minnesota. MB and Minnesota are two neighboring areas. Olmsted County is approximately 450 miles from MB. In the early 1990s, the incidence rate of CD was 15/100,000 in MB but less than 6/100,000 in Olmsted County. How can these rates be reconciled considering the short distance between the MB border and Olmsted County? The incidence of 15/100,000 is the average incidence in the province. Based on the postal forward sortation areas for which we had at least 50,000 person-years of observation between 1989 and 1994, we found a sevenfold variation in age-adjusted incidence for UC (range 4.1–28/100,000/yr) and a sixfold variation in CD incidence (range 4.0–23/100,000/yr) (12). These findings suggest substantial small-area variations in the occurrence of IBD, and it is possible that Olmsted County is at the low end of this variability within the geographic region. Although some of these geographic differences likely reflect differences in demographic mix, they also suggest the presence of environmental influences as well. Overall we have found similar rates across Canada, but it seems likely that these small-area variations will also be present in other Canadian provinces. It will be important to pursue research in this area in pursuit of potential environmental etiologic clues.

Age and Gender

Peak age of incidence in CD and the lack of a peak age in UC was mostly uniform across the country. Regarding gender, there is an excess of women by 30% in CD, but on average no gender preference in UC. Elsewhere, recently, an emerging male predominance has been shown. It is noteworthy that the most recent reports of incident pediatric CD reveal a male predominance. We found a slightly greater prevalence of boys among pediatric age subjects with comparable

incidence rates between boys and girls in our Canadian study. The male-female ratio was reported as 1.58 in Sweden for the years 1984–1995 (58), and this trend continued to the end of the 1990s (47). The male-female ratio was 4:1 in children in Wales for the years 1995–1997 (59). In a study of all newly diagnosed children presenting to a New York hospital the ratio was 1.51 (60). Newly diagnosed CD cases from across the state of Wisconsin in 2000–2001 were significantly more likely to be male (gender ratio 1.6:1) (49). In a survey of newly diagnosed pediatric cases in the UK and Ireland in 1998–1999, most (62%) CD patients were male (57). Perhaps the changing gender pattern outside of Canada from female to male predominance may provide some etiologic clues. Our CD prevalence estimates still reflect a female predominance across Canada. There was no gender predilection among pediatric or adult subjects with UC.

Socioeconomic Factors

If urban *versus* rural dwelling has any clues to disease etiology, it may be of greater value to assess incidence rates rather than prevalence. It is possible that once diagnosed, rural dwellers move to urban centers to be nearer to advanced health services. Overall there was only a marginal difference in urban *versus* rural incidence. There are many factors at play in understanding why urban dwellers appear to be at higher risk than those who live in rural areas. These include issues related to access to health services, employment, environment, and diet. It will, however, be important to reconcile infectious hypotheses with areas of residence. One example would be the hypothesis that *Mycobacterium paratuberculosis,* a common infection in cattle, is associated with CD. Clearly rural Canadians, particularly in the farming communities of the prairie provinces, may have greater access to animals harboring this organism yet rural Canadians have similar to slightly lower rates of IBD.

Summary

There are a variety of reasons as to why it is essential to pursue population-based epidemiological studies in IBD. First, it is important to quantify the magnitude of the problem. This helps health planners understand the resources that are necessary to manage these patients. Trends in the epidemiology, more importantly, can lead to disease etiology clues. Based on our data we believe that there are currently approximately 170,000 (or approximately 1 in 180) Canadians with IBD. In areas of high incidence such as Europe, it has been estimated that as many as 1 in 100 people will develop IBD in their lifetime (64). Furthermore, our data suggest that incidence rates across the country, except for BC, are among the highest in the world, not just in MB (1). Extrapolating our data to the United States suggests that as many as 1.5 million Americans have IBD. However, as discussed above, including accounting for potential disparities in incidence rate by geography (on a North-South basis), this extrapolation would need to be verified by careful epidemiological studies in the United States. The high rates of particularly CD in Canada may lend further support to a predilection for this disease among northern areas.

ACKNOWLEDGMENTS

Charles N. Bernstein is supported in part by a Canadian Institutes of Health Research Investigator Award and by the Crohn's and Colitis Foundation of Canada Research Scientist Award. James Blanchard is a Canada Research Chair in Epidemiology and Global Public Health. Mieke Koehoorn is supported by a Michael Smith Foundation for Health Research Scholar Award. This work was supported by a grant from the Crohn's and Colitis Foundation of Canada. This study is based on de-identified data provided by each provincial Ministry of Health. The interpretation and conclusions contained herein do not necessarily represent those of the governments or of the Departments of Health of BC, Alberta, Saskatchewan, Manitoba, or Nova Scotia.

STUDY HIGHLIGHTS

What Is Current Knowledge

- Ulcerative colitis and Crohn's disease often affect people in their fertile age.
- Only a few studies have been performed regarding the influence of pregnancy on disease course in inflammatory bowel disease.

What Is New Here

- Pregnancy did not prevent development of stenosis or reduce the number of surgical resections.
- Disease recurrence rate is reduced in the years following pregnancy.

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Received August 19, 2005; accepted January 17, 2006.

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The authors declared no conflicts of interest.