RESEARCH COMMUNICATION

Ethnic Differences in Survival for Female Cancers of the Breast, Cervix and Colorectum in British Columbia, Canada

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Abstract

Background: Chinese and South Asians are among the fastest growing minority populations in Canada; however little is known about the burden of cancer in these populations. Objective:The objective is to examine survival rates for breast, cervical and colorectal cancers in women within these two ethnic populations, as compared to the BC general population. Methods: Survival rates were calculated for three time periods in the Chinese, South Asian and BC general populations, using the BC cancer registry. Ethnicity within the registry was determined using surnames. Results: Survival rates for female breast, cervical and colorectal cancers have improved over time in all three population groups, however general differences were found among the groups. Chinese women had higher survival rates than both South Asians and all BC women for breast and cervical cancer, and intermediate survival rates between South Asians and all BC women for colorectal cancer. South Asian women had the highest survival rates for colorectal cancer, similar survival rates to all BC women for breast cancer, and lower survival rates for cervical cancer. Interpretation: Differences in the observed survival rates may be explained by variations in screening and early detection, treatment practices, and cancer biology. This is discussed more fully for each cancer site.

Key Words: Breast cancer - cervical cancer - colorectal cancer - survival - Chinese - South Asians - immigrants

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Introduction

The Canadian population has grown largely through net international migration (Statistics Canada, 2005), with Chinese and South Asians being among the fastest growing minority populations in the country. In the province of British Columbia (BC), these two ethnic groups represent about 70% of all visible minorities, at 44% and 25% respectively (BC Stats, 2003). BC has received a substantial proportion of the total immigration to Canada since 1980, and Chinese and South Asians accounted for 40% of all immigrants in the years 2000-2003 (Hansen, 2004). Despite this trend, the health status, health needs and access to treatment and other health care services for these immigrant groups to Canada are poorly understood.

Migrant studies have shown that cancer incidence rates vary among immigrants from different countries and these rates, over time, become very similar to those of the adopted country. We found similar trends for South Asians in BC (Hislop et al, 2007). Such comparisons can provide the first step in developing hypotheses about causation of particular cancers. In contrast, survival studies can provide information about the burden of cancer and the severity of different types of cancer.The burden of premature cancer death is not uniformly distributed across ethnic groups. Ethnic minorities experience greater morbidity, mortality and shorter survival (Shavers and Brown, 2002; Aziz and Rowland, 2002; Institute of Medicine, 1999; NCI, 2007), which may indicate differences in screening and early detection, treatment practices, and cancer biology.

This paper examines survival rates for three female cancers in two BC ethnic populations, and compares these rates to the BC general population. Identifying differences in survival among such populations can help to uncover gaps in systemic policy and program delivery, and support the planning of an enhanced cancer control system.

Methods

Study groups

a) Cancer sites: Three cancer sites were selected in females: breast, cervix and colorectum. Breast and colorectal cancers currently rank among the three most frequent cancers in BC women, accounting for 41% of all new cancer cases and 37% of all cancer-related deaths

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(CCS/NCIC, 2006a); and cervical cancer ranks fourth in incidence among BC women aged 20-44 (BC Cancer Agency, 2005a). Effective screening procedures result in earlier diagnosis and decreased mortality for these three cancer sites, and provincial screening programs exist for both breast and cervical cancers.

BC has two organized cancer screening programs, the Screening Mammography Program of British Columbia (SMPBC) and the Cervical Cancer Screening Program (CCSP). The SMPBC began in 1988 and operates as a self-referral screening mammography service. There are currently 37 screening centres, including 3 mobile units, serving over 100 communities throughout BC. The SMPBC provides two-view mammography, meeting national standards to BC women between the ages of 40 to 79 years. In addition, a linked province-wide "Fast Track" service provides diagnostic investigations to reduce the time to diagnosis following an abnormal screening mammogram. In 2004, 230,764 women received mammographic examinations, with a province-wide screening participation rate for women aged 50 to 74 years of 47% (BC Cancer Agency, 2005b). The CCSP, established in the early 1950's, provides cytological assessment and registration of all gynaecological smears collected from BC health care professionals. In 2003, 607,387 gynaecological smears were processed from 565,085 women in BC. The current 30-month screening participation rate is 60% (BC Cancer Agency, 2005c).

b) Study populations: Survival rates from these three cancer sites were determined for women from two ethnic population groups, Chinese and South Asians (predominantly Punjabi). Survival rates were also determined for the BC general population as a reference to compare with the others. The first two groups are subsets of the last group and represent the largest visible minorities in BC, numbering 365,485 Chinese and 210,295 South Asians in 2001 (BC Stats, 2003). For each population group, cancer patients were identified from the BC cancer registry with a diagnosis of invasive breast, cervical or colorectal cancer between 1980 and 2002. These women were then followed to December 2004 in order to determine survival status.

Time periods

In order to examine for temporal changes in survival and to ensure reasonable numbers of cancer cases, diagnoses were considered for three time periods: 1980-1989, 1990-1999 and 2000-2002. Prior to 1980, immigration from India was relatively infrequent. These time periods also encompass significant changes which occurred in provincial screening programs and advances in cancer treatment.

BC cancer registry

The provincial BC cancer registry, established in 1969, retains information on the cancer diagnosis (cancer site, date of diagnosis), patient's demographics (age, gender, surname), and patient's survival status as obtained from government vital statistics. Since ethnicity and place of birth are not recorded in the BC cancer registry, a listing of ethnic surnames was created in order to identify Chinese and South Asian cancer cases within the registry. Two sources were used to generate these surname lists: local telephone directories and the SMPBC database.

The names in local telephone directories were reviewed manually to identify Chinese and South Asian surnames; this was done by several members of the research team from the respective ethnic group. In addition, since the SMPBC database retains both 'place of birth' and 'ethnic group' as reported by the client, all surnames were listed from this source for Chinese women reporting 'Chinese' as their ethnicity, and South Asian women reporting 'India' as their place of birth. The same members of the research team reviewed these surname listings from the SMPBC and eliminated names that were not typically Chinese or South Asian, or which were also common to other population groups.

A total of 178 Chinese surnames and 2,787 South Indian surnames were identified from these two sources. These numbers reflect the many spelling variants of surnames when rendering into English. More detailed descriptions of these surname lists are given elsewhere (Hislop et al, 2000; Hislop et al, 2007).

Analysis

We calculated 1-year, 2-year and 5-year survival rates for the Chinese, South Asian, and BC general populations. Separate rates were calculated for people diagnosed during 1980-1989, 1990-1999 and 2000-2002. Cancer diagnoses were classified according to the International Classification of Disease for Oncology (ICDO) (Fritz et al, 2000). Our analysis considered women who were diagnosed with invasive breast (ICDO C50), colorectal (ICDO C18-C21 and C26.0) or cervical cancer (ICDO C53). All rates were standardized to the 1991 BC general population (BC Stats, 2006).

Results

The numbers of cancer cases diagnosed in all BC women between 1980 and 2002 were 44,819 for breast cancer, 3,167 for cervical cancer, and 19,611 for colorectal

Table 1. The 1-year, 2-year and 5-year Survival Rates for Invasive Breast Cancer, by Ethnic Group and Time Period.

	Chinese	South Asian	All BC
1980 - 1989	n=390	n=173	n=15,075
1-year	0.97 (0.01)	0.94 (0.02)	0.95 (<0.01)
2-year	0.95 (0.01)	0.88 (0.04)	0.89 (<0.01)
5-year	0.82 (0.03)	0.70 (0.05)	0.71 (<0.01)
1990 - 1999	n=1,009	n=415	n=22,285
1-year	0.99 (<0.01)	0.98 (<0.01)	0.97 (<0.01)
2-year	0.96 (<0.01)	0.92 (0.02)	0.91 (<0.01)
5-year	0.88 (0.02)	0.80 (0.04)	0.77 (<0.01)
2000 - 2002	n=439	n=177	n=7,459
1-year	0.98 (<0.01)	0.99 (<0.01)	0.97 (<0.01)
2-year	0.94 (0.01)	0.93 (0.04)	0.94 (<0.01)
5-year	--	--	--

Standard errors shown in parentheses

Table 2. The 1-year, 2-year and 5-year Survival Rates for Invasive Cervical Cancer, by Ethnic Group and Time Period

	Chinese	South Asian	All BC
1980 - 1989	n=81	n=34	n=1,284
1-year	0.92 (0.02)	0.99 (0.01)	0.89 (<0.01)
2-year	0.88 (0.02)	0.66 (0.15)	0.81 (0.01)
5-year	0.78 (0.05)	0.62 (0.16)	0.73 (0.01)
1990 - 1999	n=95	n=77	n=1,484
1-year	0.93 (0.04)	0.79 (0.09)	0.91 (<0.01)
2-year	0.88 (0.05)	0.69 (0.10)	0.83 (0.01)
5-year	0.81 (0.05)	0.58 (0.10)	0.73 (0.01)
2000 - 2002	n=27	n=22	n=399
1-year	0.95 (0.02)	0.99 (<0.01)	0.90 (0.01)
2-year	0.92 (0.03)	0.93 (0.03)	0.86 (0.02)
5-year	--	--	--

Standard errors shown in parentheses

Table 3. The 1-year, 2-year and 5-year Survival Rates for Invasive Colorectal Cancer, by Ethnic Group and Time Period

	Chinese	South Asian	All BC
1980 - 1989	n=214	n=50	n=7,343
1-year	0.82 (0.08)	0.90 (<0.01)	0.75 (0.02)
2-year	0.74 (0.08)	0.88 (0.01)	0.64 (0.03)
5-year	0.52 (0.12)	0.66 (0.17)	0.49 (0.03)
1990 - 1999	n=430	n=82	n=8,953
1-year	0.84 (0.05)	0.91 (0.02)	0.84 (0.02)
2-year	0.75 (0.06)	0.81 (0.01)	0.72 (0.02)
5-year	0.66 (0.06)	0.80 (0.01)	0.58 (0.02)
2000 - 2002	n=198	n=38	N=3,315
1-year	0.89 (0.06)	0.92 (0.03)	0.86 (0.03)
2-year	0.86 (0.06)	0.85 (0.03)	0.77 (0.03)
5-year	--	--	--

Standard errors shown in parentheses

cancer. The corresponding numbers in Chinese and South Asian women were 1,448 and 765 for breast cancer, 203 and 133 for cervical cancer, and 842 and 170 for colorectal cancer, respectively. The survival rates for these women are shown by time period for breast, cervical and colorectal cancers in Tables 1 to 3, respectively.

Differences were seen in survival rates among the three population groups. Survival has improved for all BC women over the three time periods for breast and colorectal cancer; however little change was noted for cervical cancer. Overall, temporal improvements were also seen for all three cancer sites for Chinese and South Asians. Chinese women had higher survival rates than both South Asians and all BC women for breast and cervical cancer, and intermediate survival rates for colorectal cancer. South Asian women, however, had similar survival rates for breast cancer and lower survival rates for cervical cancer when compared to all BC women; they had the highest survival rates among the population groups for colorectal cancer.

Discussion

Population-based cancer survival rates reflect the burden of cancer and indicate the variation in severity of different types of cancer in different populations. Differences in survival rates may be explained by variations in screening and early detection, treatment practices, cancer biology, and registry reporting practices. Comparisons between incidence and morality trends may provide further insight. Decreasing mortality with declining or temporarily increasing incidence would support effective screening and early detection, although the decline in mortality will not be apparent for 5 to 10 years after achieving high screening participation. Decreasing mortality with increasing or relatively stable incidence would support more effective treatment, although the decline in mortality may not be apparent for 10 to 15 years (CCS/NCIC, 2000).

We found overall improvement in survival for all three cancer sites in the three study populations. For all BC women, these improvements have been attributed to the introduction of screening mammography and advances in adjuvant therapies following surgery for breast cancer (Olivotto et al, 1994; Olivotto et al, 1999; Joensuu et al, 2004; Hebert-Croteau et al, 2004), to early detection by Pap smear screening and treatment of premalignant lesions for cervical cancer (CCS/NCIC, 2006b), and to declining incidence and informal causal screening for colorectal cancer (CCS/NCIC, 2001; CCS/NCIC, 2006b; Cress et al, 2006). Another study also found recent improvements in survival for US cancer patients from all ethnic groups, however ethnic differences in survival rates persisted (Clegg et al, 2002).

We found clear differences in survival among Chinese, South Asians and the BC general population. For breast cancer, survival was highest in Chinese, with South Asians and the BC general population sharing similar rates. This finding is interesting given that the proportions of participants in the SMPBC who were Chinese or South Asian were similar to the proportions found in the BC general population. Perhaps differences in treatment practices and possibly cancer biology affecting tumour progression may exist among these ethnic groups. For example, a California study found that Asian women with breast ductal carcinoma in situ were more likely to undergo mastectomy than lumpectomy (Innos and Horn-Ross, 2003).

For cervical cancer, survival was highest in Chinese, but lower in South Asians than the BC general population. This finding is consistent with lower participation in the CCSP in South Asian women (Hislop et al, 1995) but Chinese also had lower participation (Hislop et al, 2000). Cancers detected through screening programs may be subject to lead-time bias and hence inflate survival rates without any impact on the actual mortality for the cancer itself (Welch et al, 2000). However, this would not explain the better breast and cervical cancer survival in Chinese women because of their low participation in screening. It may be that ethnic differences exist in cervical cancer biology, for one study reported significantly higher risk of cervical cancer for Asian-American variants of human papillomavirus (HPV) 16 than European variants (Berumen et al, 2001) and another study reported longer persistence of HPV type 16

and 18 in the host for women whose race shared an ancestral geographic distribution with that of the HPV variant (Xi et al, 2006). The reason for higher survival in Chinese women is not clear. Perhaps the observed ethnic differences in cervical cancer survival rates can be explained by random fluctuation of rates that are based on small numbers, as evidenced by the standard errors for each rate.

For colorectal cancer, survival was highest in South Asians, and higher in Chinese than the BC general population. This perhaps again suggests ethnic differences in treatment practices and possibly dietary habits, believed to be the main lifestyle factor affecting colorectal cancer incidence, for it is unlikely that South Asian and Chinese women would be more likely to participate in informal screening than other BC women. However, the roles of food in colorectal cancer risk (Marques-Vidal et al, 2006; Papapolychroniadis, 2004) and cancer progression (WCRF/AICR, 1997) are not yet clear.

A prospective study of Japanese adults found no association between dietary intake and colorectal cancer mortality, except for an inverse association between green leafy vegetable consumption and rectal cancer mortality in men and direct association between high fruit consumption and colon cancer mortality in women (Kojima et al, 2004). Perhaps the answer will be found in part in cancer biology, for a common variant of genetic susceptibility for colorectal cancer among South Asians (MTHFR 1298C) was associated with a significantly reduced risk for colorectal cancer (Wang et al, 2006). Whether this genotype also affects disease progression or the effectiveness of treatment is not known.

Varying survival rates have been reported in the literature among different ethnic populations (Shavers and Brown, 2002; Aziz and Rowland, 2002; Institute of Medicine, 1999; NCI, 2007). Higher survival rates have been reported for Asian American patients with breast and colorectal cancer as compared to other major ethnic minority groups (Clegg et al, 2002). Survival rates for South Asian women with breast cancer have been inconsistent: better survival was reported for South Asian women in one study in England (Farooq and Coleman, 2005), but not in other studies conducted in England (Velikova et al, 2004) and California (Parikh-Patel et al, 2006).

Despite current evidence supporting population-based screening for breast, cervical and colorectal cancers, there is suboptimal participation in screening for these cancers. In fact, an organized population-based screening program for colorectal cancer is not yet available to the BC population. The literature has consistently shown low screening rates for breast and cervical cancer among Chinese (Lee-Lin and Menon, 2005; Kagawa-Singer and Pourat, 2000) and South Asian women (Hislop et al, 1996). Awareness about cancer was low (Lee-Lin and Menon, 2005) and structural barriers to cancer control efforts exist, including low income and lack of a usual source of care (Kagawa-Singer and Pourat, 2000).

In addition, Asian American women were earlier found to have the lowest rate of biopsy-diagnosed high-grade precancerous and cancerous lesions for first program screens as compared to other ethnic groups (Benard et al, 2001). Although informal screening for colorectal cancer is relatively prevalent in BC, it is unlikely that South Asian and Chinese women would be more likely to participate in such informal screening than other BC women.

Our study has several strengths. Firstly, there were no differences in registry reporting methods among the study groups for we used a single population-based cancer registry with reliable follow-up data to establish survival rates (BC Cancer Agency, 2006). Secondly, we examined over 20 years of data on incident cancer cases, which provided reasonable numbers of cancer cases in each ethnic group. In addition, our study has several limitations. Firstly, data was lacking in the cancer registry on the stage of disease at diagnosis (an important prognostic factor that could not be accounted for when comparing survival rates) and on ethnicity (necessitating the creation of ethnic surname lists to identify the study groups). Secondly, the follow-up period was short for the most recent time period, permitting only 1-year and 2-year survival rates. Thirdly, the absence of cervical cancer cases in some age groups required broad groupings for age-standardization to be implemented. Fourthly, observed ethnic differences in survival may be explained by other sociodemographic factors, such as socioeconomic position. Investigators have found that the incidence of several cancers, including breast, cervix and colon, varied as much if not more by socioeconomic position as by ethnicity (Krieger et al, 1999).

All women in BC are offered provincial screening programs for breast and cervical cancer, and provincial treatment guidelines for various cancer sites; however, there are differences among ethnic groups in participation in these programs, access to treatment and treatment choices. Promotional efforts for existing programs need to address appropriate messaging and service delivery in order to increase participation, especially among hard-to-reach and vulnerable populations. It is known that cultural beliefs and practices are foundational to behaviours intended to promote good health, and Canada's health and social service system must accommodate these cultural differences and offer culturally appropriate alternatives. In addition, colorectal cancer screening would best be served in the context of a provincial coordinated cancer screening program. Finally, the Canadian cancer surveillance system is one of the best in the world; however, limitations in available information indicate that further improvements in data quality and completeness are needed. Then survival patterns can be better explained which would support the planning of an enhanced cancer control system.

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