Original Research

Cervical intraepithelial neoplasia in female prisoners in British Columbia

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The annual incidence rates of cervical intraepithelial neoplasia (CIN), grades I to III, from 1975 to 1983 among 2440 prisoners in British Columbia for whom a history of screening by means of the Papanicolaou test was available were two to three times higher than the expected rates in the general female population of British Columbia. The rates among the prisoners from 1970 to 1984, although small, increased with a trend similar to that in the general population. Despite increases in the general population we conclude that prisoners are still at high risk for CIN.

En Colombie britannique de 1975 à 1983 chez 2440 prisonnières pour qui nous avons des renseignements sur le dépistage par le frottis de Papanicolaou, nous trouvons des taux annuels de survenue de néoplasie intra-épithéliale du col utérin (degré I à III) qui sont de deux à trois fois supérieurs à ceux de la population de la province dans son ensemble. De 1970 à 1984 les taux chez les prisonnières, bien que faibles, manifestent une tendance à la hausse qui, si elle ressemble à ce qui s'observe dans la population générale, ne laisse pas de faire croire que ce genre de néoplasie représente un risque élevé pour les prisonnières.

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British Columbia established a provincial screening program in 1949 to detect cervical cytologic abnormalities.[1] Since then the incidence of and mortality rate for invasive carcinoma of the cervix have decreased significantly,[1] the decrease being similar to that observed in other areas with well-organized screening programs.[2,3] However, invasive cervical cancer has not disappeared; this may be due to several factors, such as insufficient screening among women at high risk. One group believed to be at high risk is the female prison population. Several reports[4,5] have indicated that the rates of cervical cancer and its precursor, cervical intraepithelial neoplasia (CIN), are higher among prisoners than in the general population.

In this article we examine the annual in-

Table I — Distribution of cervical smears obtained each year in the general and prison populations in British Columbia from 1970 to 1984 by age group

Age group, yr	Population; no. (and %) of smears	
	General	Prison
≤ 19	368 167 (6.6)	1 780 (18.0)
20–24	951 318 (17.1)	2 672 (27.1)
25–29	978 160 (17.6)	2 276 (23.0)
30–34	764 535 (13.8)	1 399 (14.2)
35–39	550 010 (9.9)	749 (7.6)
40–44	434 784 (7.8)	418 (4.2)
45–49	394 974 (7.1)	259 (2.6)
50–54	359 963 (6.5)	154 (1.6)
55–59	293 099 (5.3)	107 (1.1)
60–64	211 591 (3.8)	42 (0.4)
≥ 65	250 210 (4.5)	20 (0.2)
Total	5 556 811	9 876

cidence rates of CIN among women incarcerated in British Columbia and compare them with those in the female population of British Columbia. In addition, we examine whether the higher rates observed among prisoners in other countries are seen among the British Columbia prisoners.

Material and methods

The British Columbia Corrections Branch supplied the names, corrections numbers and dates of birth for all women in prison from 1975 to 1983. The patient histories for 5596 women were matched for full name and date of birth with the records in the cervical cytology database, which maintains records on all women screened in British Columbia (approximately 1.5 million women). Of the 5596 women 2440 had a history of screening for CIN. Data were abstracted on the screening history and the pathological features of CIN (grades I to III) of the 2440 screened women.

CIN is an asymptomatic disease diagnosed by means of biopsy after the discovery of an abnormal cervical smear. For this study we assumed that only the women who had a smear were likely to have CIN diagnosed; thus, the prevalence rates were calculated with the number of women screened as the denominator. For the purposes of comparison, the rates were calculated for the general female population on the basis of the number of women screened each year from 1970

Table II — Observed (O) and expected (E) number of cases of cervical intraepithelial neoplasia (CIN) in the prison population, by age and period of diagnosis

	Period; no. of cases							
	1970–74		1975–79		1980–84		Total no.	
Age, yr	O	E	O	E	O	E	O	E
≤ 19	1	0.21	2	1.27	14	3.62	17	5.10
20–24	4	1.44	20	8.07	29	13.54	53	23.05
25–29	10	2.09	35	9.23	44	18.72	90	30.04
30–34	6	1.26	11	4.82	24	10.92	41	17.00
35–39	1	0.57	2	2.08	12	3.40	15	6.05
40–44	0	0.32	0	0.92	1	1.39	0	2.63
45–49	1	0.15	1	0.41	3	0.63	5	1.24
50–54	1	0.04	0	0.22	0	0.33	1	0.59
≥ 55	0	0.04	0	0.19	0	0.28	0	0.51
Total	24	6.12	71	27.21	127	52.88	222	86.20
O/E	3.92		2.61		2.40		2.58	
95% confidence limits	2.64, 5.51		2.07, 3.18		2.02, 2.78		2.26, 2.88	

Table III — Observed and expected numbers of cases of grade III CIN in the prison population, by age and period of diagnosis

	Period; no. of cases							
	1970–74		1975–79		1980–84		Total no.	
Age, yr	O	E	O	E	O	E	O	E
≤ 19	0	0.15	0	0.76	8	1.67	8	2.58
20–24	5	1.21	15	5.44	18	7.35	38	14.00
25–29	7	1.83	28*	6.35	29	11.55	64	19.73
30–34	5	1.10	11	3.36	16	6.68	32	11.14
35–39	0	0.50	1	1.36	9	2.45	10	4.31
40–44	0	0.27	0	0.54	0	0.85	0	1.66
45–49	1	0.12	1	0.23	2	0.31	4	0.66
50–54	1	0.04	0	0.10	0	0.13	1	0.27
≥ 55	0	0.03	0	0.09	0	0.13	0	0.25
Total	19	5.25	56	18.23	82	31.12	157	54.6
O/E	3.62		3.07		2.63		2.82	
95% confidence limits	2.32, 5.31		2.37, 3.83		2.12, 3.17		2.46, 3.28	

*There was microinvasion in one case.

to 1984. The prevalence rates were standardized with the use of the age distribution of the general population of women screened in 1984. Expected numbers of CIN cases among the prisoners were calculated by means of the appropriate annual and age-specific prevalence rates of disease in the screened general population.

Significance and confidence limits were calculated with the assumption that the observed number of cases of CIN had a Poisson distribution, with the mean equal to the expected number of cases, calculated from the rates for the general population of screened women. Three-year moving average prevalence rates were calculated for the two groups with the use of the weighted average centred at each year (i.e., the total number of cases divided by the total number of smears for the 3-year period).

Results

The distribution of the number of smears per person in the screened prison population was similar to that in the screened general population, the means being 6.2 and 6.5 respectively. As expected, the prisoners were a younger group than the women in the general population (Table I); each entry in Table I represents the sum of smears obtained each year from every woman in the appropriate age range.

For each 5-year period the number of cases of CIN in the prison population exceeded that expected (Table II); these excesses were statistically significant. The overall incidence rate was three times higher in the screened prison population than in the screened general population. There is some indication that the magnitude of the relative excess, as measured by the ratio of observed to expected cases, decreased during 1970 to 1984, although this trend was not statistically significant.

The observed number of cases of grade III CIN exceeded the expected number in each 5-year period (Table III); this difference was statistically significant. As for all cases of CIN, the relative excess of grade III disease had decreased in more recent years, but again the decline was not statistically significant.

Fig. 1 plots the 3-year moving average prevalence rates of CIN in the two groups for 1971 to 1983. It also plots the corresponding prevalence rates among women aged less than 35 years. Although there were some statistical fluctuations the prevalence rates of disease increased in the two groups. The prevalence rates of grade III CIN in the general and prison populations also increased over the study period (Fig. 2).

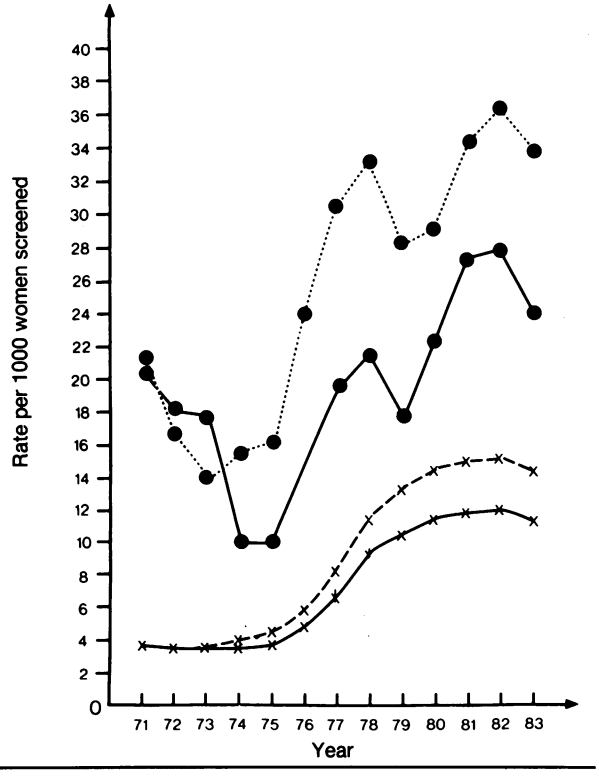

Fig. 1 — Three-year moving average annual prevalence rates of cervical intraepithelial neoplasia (CIN) among female prisoners (•) and general female population (×) in British Columbia (rates standardized by means of age distribution of general population screened in 1984) from 1971 to 1983. Solid lines represent all women and broken lines women under 35 years of age.

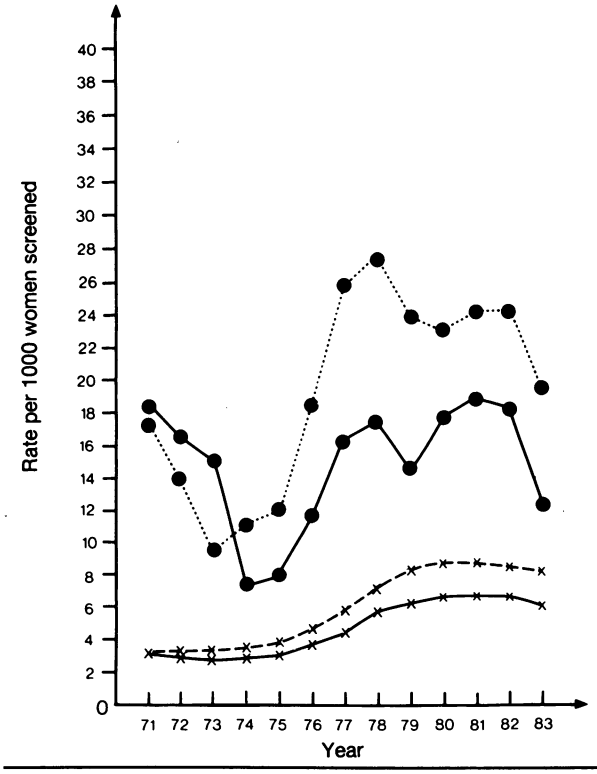

Fig. 2 — Three-year moving average annual prevalence rates of grade III CIN (rates standardized by means of age distribution of general population screened in 1984) from 1971 to 1983. Symbols and line designations as in Fig. 1.

Discussion

The diagnosis of CIN is directly related to the frequency of screening by means of the Papanicolaou test; this is because the disease is asymptomatic and has a high rate of reversion to normal tissue.[6] For example, CIN that spontaneously reverts after 18 months may be missed if screening is done biennially but will be detected if screening is done annually. Thus, the higher the frequency of screening, the more likely disease will be detected.

The magnitude of the incidence rate of CIN in a population depends on the true incidence rate of the disease, the screening history of the population and the nature of therapeutic intervention in response to screening results. Therefore, it is difficult to compare the observed frequency of disease in two populations with dissimilar screening histories. In the study reported here we were able to find a history of cervical screening in only 44% of the women in the prison population, whereas in 1984 alone more than 42% of the women over 20 years of age were screened in British Columbia. Some of the women without such a history could have in fact been screened either outside the province or in the province under another name. Because such results were unknown to us we compared the rates of CIN in the screened populations alone. The selection of the two groups in this study was advantageous because the women had to be considered residents of the province, and we had no information on the residence of the prisoners at times other than their incarceration.

Although the mean number of smears was similar in the two groups (6.2 and 6.5), the figures are difficult to compare because the prisoners were younger on average than the general population (and thus may be expected to have fewer smears) and because the frequency of disease diagnosed was higher among the prisoners than among the general population, which usually results in recommendation for more frequent screening. The incidence rate of CIN among prisoners for whom we could find no history of screening was possibly lower than that of prisoners with a history; however, because 44% had been screened and the incidence rate of CIN in this group was approximately three times that of the screened general popuation, it seems reasonable to conclude that the rate of CIN is generally elevated among prisoners, as has been observed in other countries.[4,5] The higher prevalence rates of CIN in the prison population could have reflected differences in the treatment of disease because of poor compliance. Regardless of the reason for the observed differences these findings do emphasize the need for screening and appropriate therapeutic intervention.

There was some evidence that the difference in incidence rates of CIN between the two groups had diminished in more recent years, although the difference was still significant. Because the incidence rates of CIN and grade III CIN have increased in the two groups the prison population continues to be at substantially increased risk. A similar pattern is also seen among women under 35 years of age; careful monitoring of these women is needed because they account for most of the female prison population.

The primary objective of any program of screening for cervical cytologic abnormalities is the prevention of invasive disease. Four cases of invasive disease were reported in the prison population; unfortunately, we cannot determine whether this represents an excessive occurrence. The calculation of an appropriate expected number of cases (with the use of rates in the general population) requires knowledge of the time of residence of each woman, which was unavailable.

Despite uncertainty about the risk of invasive cervical cancer in the prison population, the incidence of CIN suggests that these women are at increased risk. The reason for this is unknown, although it could be related to an increased rate of promiscuous behaviour and, to a lesser extent, an increased rate of cigarette smoking. In light of the findings of this study the first medical examination after incarceration should include cervical screening, with appropriate follow-up. Similarly, any medical examination of a prisoner, or ex-prisoner, should include cervical screening unless the results of previous tests indicate that this is unnecessary. Routine cervical screening among female prisoners provides an excellent opportunity to use a recognized screening method in a high-risk population.

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