

Original Article

Incidence And Mortality Trend of Cervical Cancer in 11 Cancer Registries of China

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ABSTRACT

Objective: In many countries, the cervical cancer prevalence has declined but less information about the changes is available in China. This study aims to understand the epidemiological characteristics and trend of cervical cancer in China.

Methods: Cervical cancer data of 11 cancer registries during 1988-2002 in China were analyzed. The age and urban/rural differences and trend of cervical cancer incidence and mortality were described and discussed.

Results: During 1988-2002, a total of 6007 incidence cases and 3749 mortality cases of cervical cancer were reported in the 11 cancer registries. The incidence crude rate of cervical cancer was 3.80/100,000 and the world age adjusted rate was 2.78/100,000. In the same period, the mortality crude rate was 2.37/100,000 and the world age adjusted rate was 1.66/100,000. Declined incidence and mortality trends were observed during this period in urban as well as in rural areas. When calculating the rates by age group, we found that the declining trends were only for older women and increasing trends for younger women, especially for women in the rural areas.

Conclusion: The incidence and mortality rates declined during the period of 1988-2002 in China for older women. The younger women showed an increasing trend during the same period, especially for women in rural area.

Key words: Cervical cancer; Incidence; Mortality; Trend; China

INTRODUCTION

Cervical cancer is a common malignant neoplasm of the cervix uteri in women. According to Globocan2002, the estimated incidence cases in the world was 493,243 with 83.0% of new cases in the less developed countries^[1]. In recent decades, the incidence rates of cervical cancer showed a decreasing trend in many countries^[2-4]. China, as a less developed country with huge population, the incidence and mortality rate of cervical cancer there was a decreasing trend in the period of 1970-1990^[5-6]. In Qidong, China, a relatively low incidence area of cervical cancer, there was a decreasing trend of incidence rate among aged women during the period of 1972-2000, according to population-based cancer registration data^[7]. Due to the lack of valid data, the national analysis about cervical cancer prevalence was unavailable.

In 1996, the Ministry of Science and Technology of the People's Republic of China set up a research program for national cancer registration, risk surveillance and risk

assessment. It was finished in 2000. It was the first time to establish a nation wide network of cancer registration in China. The cancer registries have followed the international rules and standards, therefore, the data collected on the incidence and mortality of cervical cancer in this system over the past 15 years have provided an opportunity to study the time trends of cervical cancer in China.

MATERIALS AND METHODS

Data Source

The cancer incidence and mortality data used in this study were based on a series of publications that included data from cancer registries in China for three periods of 1988-1992, 1993-1997, and 1998-2002. The related books were published in 2001, 2002 and 2007 respectively^[8-10].

All cancer registries were population based and followed the rule and standard recommended by the International Agency for Research on Cancer (IARC) and the International Association for Cancer Registration. The details of methodology have been documented in the series publications by IARC^[11-12]. In this study, the periods and coding used were same as above. All data of each cancer registry were reported to the National Cancer Research and Control Office for quality assessment and data analysis.

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Data collected included population, incidence cases, and mortality cases by 5 years age group, sex and area.

For data consistence, this study selected data from 11 cancer registries that covered by all three volumes published by IARC. Those cancer registries included five cities, namely Beijing, Shanghai, Tianjin, Wuhan and Harbin, and seven counties, Cixian of Hebei province, Linzhou of Henan province, Qidong of Jiangsu province, Jiashan of Zhejiang province, Fusui of Guangxi province and Changle of Fujian province. For those 11 cancer registries, the analysis covered three periods, 15 years (1988-2002).

Population Data

For the 11 cancer registries during 1988-2002, the population covered 322,524,575 person-year, including 164,427,425 male (50.98%) and 158,097,150 female (49.02%), the sex ratio is 1.04; and 242,020,858 in cities (male: 123,242,963, female: 118,777,895, sex ratio=1.04), rural areas 80,503,717 (male: 41,184,462, female: 39,319,255, sex ratio=1.05). Among those, 13.97% were over 60 years old (male 12.73%, Female 15.22%).

Data Analysis

The statistical indicators included crude rate (CR), age-adjusted rate by world population (WSR), age-adjusted rate by Chinese standard population (CASR), age-specific

rate, 35-64 truncated rate (35-64TR), 0-64 cumulative rate (0-64CUMR) and 0-74 cumulative rate (0-74CUMR) for incidence as well as mortality by sex. The 1985 world standard population and the 2000 Chinese standard population were used for age adjusting. Statistical software package SPSS 13.0 was used.

RESULTS

Incidence and Mortality Rates of Cervical Cancer in China

During 1988-2002, a total of 6007 incidence cases and 3749 mortality cases of cervical cancer were reported in the 11 cancer registries. The incidence rate of cervical cancer was 3.80 per 100,000 for CR, 2.16 per 100,000 for CASR, 2.78 per 100,000 for WSR, 4.61 per 100,000 for 35-64 TR, 0.16% for 0-64 CUMR and 0.33% for 0-74 CUMR, respectively. In the same period, the mortality of cervical cancer was 2.37/100,000 for CR, 1.21/100,000 for CASR, 1.66/100000 for WSR, 1.97/100,000 for 35-64 TR, 0.07% for 0-64 CUMR and 0.19% for 0-74 CUMR (Table 1).

Trend of Incidence and Mortality Rates

In comparison between periods of 1988-1992 and 1998-2002, the incidence CR and WSR of cervical cancer decreased by 17.00% and 30.44% respectively; mortality CR and WSMR by 34.00% and 48.44% (Table 2 and Figure 1).

Table 1. Incidence and mortality rates of cervical cancer in the period of 1988-2002

	Case	CR	CASR	WSR	0-64 CUMR%	0-74 CUMR%	35-64TR
Incidence	6007	3.80	2.16	2.78	0.16	0.33	4.61
City	5030	4.23	2.25	2.92	0.16	0.35	4.60
Rural	977	2.48	1.76	2.20	0.15	0.24	4.50
Mortality	3749	2.37	1.21	1.66	0.07	0.19	1.97
City	3050	2.57	1.21	1.67	0.06	0.19	1.79
Rural	699	1.78	1.17	1.56	0.09	0.17	2.58

Table 2. Incidence and mortality rates of cervical cancer in the period of 1988-2002

Period	Case	CR	CASR	WSR	0-64 CUMR%	0-74 CUMR%	35-64TR
Incidence							
1988-1992	2228	4.29	2.58	3.45	0.30	0.45	5.32
1993-1997	1876	3.56	2.00	2.59	0.14	0.32	3.74
1998-2002	1903	3.56	1.98	2.40	0.16	0.25	4.42
Mortality							
1988-1992	1495	2.88	1.63	2.25	0.16	0.27	2.50
1993-1997	1235	2.35	1.22	1.66	0.07	0.19	1.96
1998-2002	1019	1.90	0.86	1.16	0.05	0.11	1.38

Age Specific Rates of Cervical Cancer

Cervical cancer was a typical aging disease with starting age from 15 and reached the peak at age group 75-79 and 5 years delay for mortality. Even though the ASIR and ASMR of cervical cancer showed a decreasing trend, the reversed changes were observed for women at middle age groups. In

comparison between periods of 1988-1992 and 1993-1997, the age specific incidence rates showed an increase for age group under 45 years old and decreasing for 45 or old group. For those between periods of 1993-1997 and 1998-2002, the cut point was 55 years old. The mortality showed a similar trend as incidence (Table 3, Figures 2, 3).

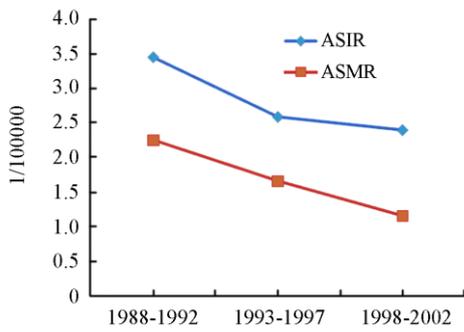


Figure 1. Trend of incidence rate of cervical cancer in the period of 1988-2002.

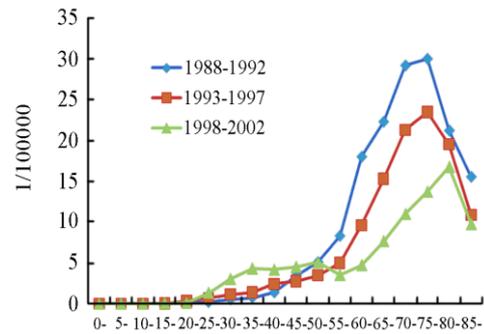


Figure 2. Age specific incidence rate of cervical cancer by period

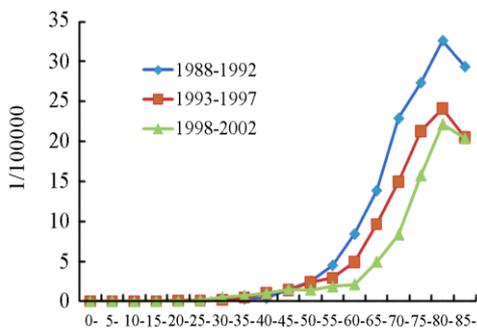


Figure 3. Age specific mortality rate of cervical cancer by period

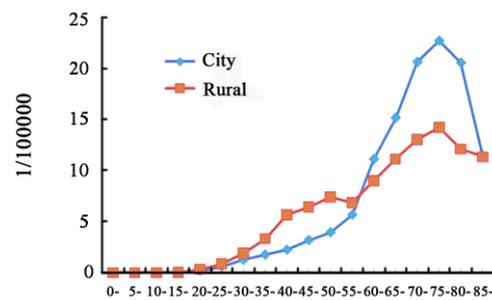


Figure 4. Age-specific incidence rate of cervical cancer by area

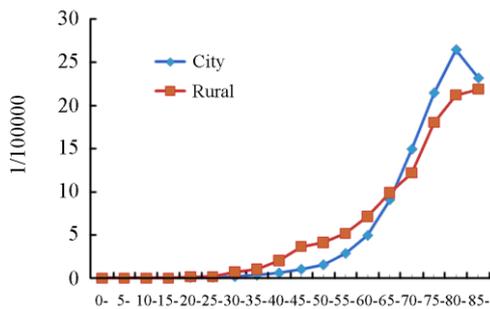


Figure 5. Age-specific mortality rate of Cervical cancer by area

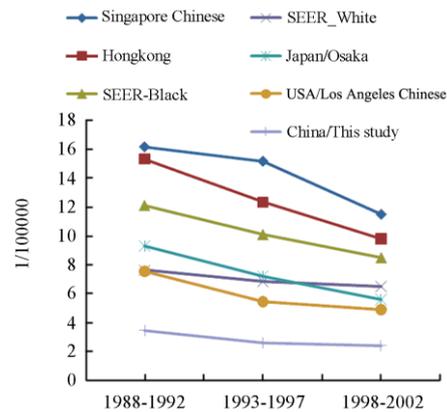


Figure 6. Trend comparison of incidence rate of cervical cancer among selected populations.

Table 3. Incidence and mortality rates of cervical cancer by age group (1/100,000)

	0-	5-	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	80-	85-
Incidence																		
1988-1992	0.00	0.00	0.00	0.00	0.18	0.21	0.77	0.55	1.39	3.47	5.11	8.33	18.05	22.35	29.26	30.08	21.27	15.58
1993-1997	0.00	0.00	0.00	0.03	0.33	0.69	1.42	1.16	2.45	2.76	3.49	5.03	9.65	15.32	21.34	23.55	19.57	10.90
1998-2002	0.00	0.00	0.00	0.07	0.11	1.35	4.34	3.05	4.19	4.54	5.07	3.56	4.75	7.69	11.04	13.77	16.84	9.80
Total	0.00	0.00	0.00	0.04	0.21	0.69	2.12	1.42	2.90	3.76	4.64	5.85	10.88	14.54	19.56	21.46	18.94	11.63
Mortality																		
1988-1992	0.00	0.00	0.00	0.00	0.05	0.04	0.31	0.20	0.39	1.53	2.50	4.50	8.42	13.86	22.90	27.35	32.63	29.37
1993-1997	0.00	0.00	0.00	0.00	0.11	0.10	0.48	0.19	1.00	1.43	2.37	2.94	4.94	9.65	14.98	21.28	24.09	20.51
1998-2002	0.00	0.00	0.00	0.00	0.05	0.19	0.73	0.50	1.02	1.51	1.44	1.87	2.12	4.96	8.35	15.75	22.15	20.37
Total	0.00	0.00	0.00	0.00	0.07	0.10	0.50	0.28	0.86	1.49	2.05	3.22	5.20	9.14	14.63	20.76	25.66	22.71

Table 4. Incidence and mortality rates of cervical cancer by area (1/100,000)

	0-	5-	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	80-	85-
Incidence																		
City	0.00	0.00	0.00	0.04	0.18	0.60	1.26	1.77	2.25	3.19	3.95	5.67	11.13	15.17	20.64	22.72	20.56	11.45
Rural	0.00	0.00	0.00	0.04	0.34	0.85	1.91	3.34	5.67	6.43	7.43	6.86	9.03	11.14	13.06	14.24	12.12	11.35
Mortality																		
City	0.00	0.00	0.00	0.00	0.05	0.08	0.17	0.35	0.59	1.02	1.54	2.86	4.94	9.07	14.93	21.44	26.44	23.16
Rural	0.00	0.00	0.00	0.00	0.15	0.18	0.75	1.06	2.06	3.67	4.11	5.19	7.16	9.89	12.19	18.03	21.21	21.87

Table 5. Comparison of incidence rate of cervical cancer for the period of 1988-2002

Country/area	1988-1992		1993-1997		1998-2002	
	CR	WSR	CR	WSR	CR	WSR
USA/SEER						
White	9.76	7.63	8.88	6.85	7.90	6.50
Black	12.89	12.13	11.15	10.11	9.70	8.50
Japan/Osaka	12.96	9.29	10.88	7.22	8.70	5.60
Hongkong	17.12	15.34	15.12	12.34	13.30	9.80
China/This study	4.29	3.45	3.56	2.59	3.56	2.40
Singapore Chinese	16.67	16.17	16.95	15.18	14.40	11.50
USA/Los Angeles Chinese	8.61	7.54	7.29	5.44	7.00	4.90

Difference between City and Rural Area

In comparison of the incidence of cervical cancer between city and rural area, the cervical cancer was 33% higher in urban than rural areas while and the mortality was slightly high (0.07%) in urban than rural areas (Table 1).

To compare it by age group, for age under 60, the age specific rates of cervical cancer for women in rural areas were higher than that in city, but lower for women at 60 or older (Table 4, Figure 4). A similar trend like incidence was observed for age specific mortality rates with an extended cut point at 70 or older (Table 4, Figure 5).

DISCUSSION

The data used in this study were based on 11 cancer registries which were collaborative partners of a national program for cancer registration in China, and provided the most reliable, the largest comparable sample size and the longest period data source in China. In addition, the data of 11 cancer registries were accepted by IARC.

As estimated the prevalence rate of cervical cancer in the world was 16.2 per 100,000 for incidence and 8.9 per 100,000 for mortality (10.3 per 100,000 and 6.4 per 100,000 in more developed countries; and 19.1 per 100,000 and 9.5 per 100,000 in less developed countries), respectively. We compared the incidence rates of cervical cancer in SEER program and Chinese of Los Angeles in the US, Osaka of Japan, Hongkong, China and Singapore Chinese, the rates of cervical cancer decreased worldwide including China, a country at a relative low level (Table 5 and Figure 6).

Table 5 shows a comparison among different populations including SEER program and Chinese of Los Angeles in the United States of America, Osaka of Japan, Hongkong and Singapore Chinese. The incidence rate of cervical cancer decreased worldwide including China, a country at lower level (Table 5 and Figure 6).

Although time trend of overall cervical cancer has been decreasing during the past 15 years, the rates of incidence or mortality have been increasing for young women. This study revealed a reversed trend in young women, particularly in rural area. It is very important for oncologist and health authorities to pay more attention to this phenomenon.

An early cervical cancer-screening program in a population of 22,106 women aged over 25 years in a rural county of China indicated that the relative risk of cervix cancer was 0.33 in women with three or more negative smear tests^[13], supporting the cervical cancer screening is an efficient method for cervical cancer control^[14,15].

It has been reported that the immigrants in the United States would change their cancer patterns and rates from original countries to that in the new country after certain years and generations^[16,17].

A number of factors may be associated with the development of cervical cancer. The most important risk factor for cervical cancer is human papillomaviruse (HPV) infection. A case-control study was conducted in Hubei, China and reported that HPV DNA was detected in 94.55% of patients with cervical cancer, and 23.64% of control subjects^[18]. The risk of cervical cancer among women infected with HPV was 75.79 times greater than non-infected women. Due to the fact that the path of HPV infection is through sexual activities, resulting a constant increasing rates of sexual diseases and HPV infection during the same period of this study^[19, 20], we assume that the increasing trend of cervical cancer in young women who are sexual active may be associated with high epidemic of HPV. Further studies are needed to explore the possible reasons for the increased trend of cervical cancer and control cervical cancer in China.

In summary the incidence and mortality rates declined during the period of 1988-2002 in China, including urban

and rural areas. When the data classified by age group, the declining trends only showed for older women. The younger women showed an increasing trend during the same period, especially for women in rural area.

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