

RESEARCH COMMUNICATION

Incidence Trends in Invasive Uterine Cervix Cancer and Carcinoma in Situ in Incheon, South Korea

Yoo Kyung Boo¹, Woo Chul Kim^{2*}, HY Lee³, JH Leem⁴, MH Lee⁵, JS Leem⁶

Abstract

Introduction: This study examined trends of invasive and carcinoma in situ (CIS) in terms of the incidence and mortality of uterine cervix cancer in Incheon over a twelve year period. **Methods:** Uterine cervical cancer data were retrieved from the Incheon Cancer Registry (ICR) and Korea Central Cancer Registry (KCCR) from 1997 to 2008. The time trend in age-standardized incidence rates (ASR) of invasive uterine cervix cancer and CIS were calculated and compared with the nation-wide cancer registry data for each year. Mortality/incidence (M/I) ratios according to age and the incidence of pathological subtype in Incheon each year were also examined, along with an international comparison. **Results:** A total of 3,096 cases of invasive cervical cancer and 2,079 cases of carcinoma in situ were analyzed from 1997 to 2008. The time trend incidence of the total ASR in uterine cervical cancer decreased from 25.7 in 1997 to 13.4 in 2008, but incidence of CIS increased from 7.6 to 15.8 in same period. In invasive cancers, the age-specific incidence rates were highest in those in their sixties and patients in their forties showed highest incidence of CIS. The mortality rate in ICR was 3.7 from 1998 to 2002. Compared to the other countries which have high risk factors for cervix cancer, the peak incidence zone was different in Incheon. **Conclusion:** The ICR showed a decrease in the incidence of invasive cervical cancer that was similar to the nation-wide data. An early increase zone is a characteristic pattern in the age specific incidence curve. Early screening and a vaccination program should be activated for prevention of young age cervical cancer.

Keywords: Cervix uteri - carcinoma in situ - incidence - epidemiology - age dependence - Incheon, Korea

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Introduction

Cervix cancer is the seventh in frequency overall but the second most common cancer in women worldwide. This cancer is much more common in developing countries, where 83% of cases occur and where it accounts for 15% of female cancers with a risk before the age of 65 of 1.5%. In developed countries, cervical cancer accounts for only 3.6% of new cancers, with a cumulative risk (0 to 64) of 0.8%. The highest incidence is observed in sub-Saharan Africa, Melanesia, Latin America and the Caribbean, South Central Asia and Southeast Asia (Parkin et al., 2005).

In Korea, uterine cervical cancer was the most common cancer in women during the 1980s. Over the past two decades, its incidence has decreased and currently it ranks the sixth most common cancer (ASR 12.9%) among women according to the 2008 Annual Report of the Korea Central Cancer Registry (KCCR, 2010). Uterine cervical cancer is an invasive cancer and a relatively slowly progressive disease. Therefore, early detection

at the period of carcinoma in situ is associated with a good survival rate. Regular cervical cancer screening is associated with an earlier stage of invasive disease at diagnosis and the decreased incidence through the detection and treatment of preinvasive disease (Benard et al., 2007). This change can be attributed to the wide acceptance of cervical cancer screening programs, including National Cancer Control Program by the Korean government, which was started in 1999 (Kwak et al. 2005). Currently, the Korean national health insurance covers biannual Pap smears for all women aged over 30 years (Jo et al., 2007).

Population based registries are useful in the context of documenting the cancer patterns in a given region/country, measuring the cancer burden and studying the survival from cancer as well as evaluating the trends in the incidence of cancer over time (Parkin, 2008). In 1980, the nationwide, hospital-based Korea Central Cancer Registry was established and managed by the Ministry of Health and Welfare (KCCR, 2010). The regional cancer registry started in 1995, and covered 46.1% of the entire population

¹Department of Healthcare Administration, College of Health Industry, Eulji University, ²Departments of ³Radiation Oncology, ⁴Medical Records, ⁵Occupational Medicine, ⁶Internal Medicine, College of Medicine, Inha University, ⁶Department of Preventive Medicine, College of Medicine, Gachon Gil University, Incheon, Korea *For correspondence: cancer@inha.ac.kr

in Korea. The regional cancer registry consisted originally of 8 cancer registries, but now several new cancer registries were added and covered the entire population in Korea. The Incheon Cancer Registry has been collecting new cancer cases occurring in Incheon since 1997 and was included in Incidence in Five Continents (CI5), Vol. IX.

The present study examined the trend of invasive uterine cervical cancer and carcinoma in situ in terms of the incidence and mortality in Incheon over a twelve year period.

Materials and Methods

The Incheon Cancer Registry (ICR) covers 2.7 million people and a total surface of 1,029km². All cases of invasive cervical cancers and carcinoma in situ from 1997 to 2008 were included in the present study. Data from both ICR and KCCR, which contained 5 other metropolitan cancer registries (Seoul, Daegu, Gwangju, Daejeon, Busan) in Korea, were used. The ICR is a population-based cancer registry. The data of the ICR was obtained from several sources, such as hospital cancer registries in Incheon, Korea National Health Insurance Company data, registration data from other cities in the KCCR and data on cervical cancer deaths and the annual population from the Korea National Statistical Office.

The age standardized incidence rate of invasive cervical cancer and carcinoma in situ in Incheon was calculated by the direct method, using the world standard population and compared with the nationwide data in Korea. The age-specific incidence and mortality were also calculated. The analyzed tumor histopathological subtype in this study included squamous cell carcinoma and adenocarcinoma. Other carcinomas, such as glassy cell type, adenosquamous carcinoma etc., were not shown in the figures because of the low incidence. In the Incheon Cancer Registry, all tumors were coded according to the International Classification of Diseases for Oncology [ICDO-3]. The following histological groups were considered: (1) squamous cell carcinoma (ICDO 8050–8082); (2) adenocarcinoma (ICDO 8140–8550) and adenosquamous (ICDO 8560, 8570); (3) cervical cancers Not Otherwise Specified (NOS; 8000–8004, 8010–8034) and other histological types.

The crude, age standardized incidence rates (per 100,000 person-years) were calculated based on the general guidelines of the International Agency for Research on Cancer. An international comparison was made regarding the incidence and mortality based on the Cancer Incidence in Five Continents Vol. IX.

Results

A total of 3,096 cases of invasive cervical cancers and 2,079 cases of carcinomas in situ were registered in the Incheon Cancer Registry from 1997 to 2008. The mean rate of histological verified cases was 96.8% and it was not significantly changed during twelve year period. The main histological subtype was squamous cell carcinoma and its incidence was 79.9%, followed by an adenocarcinoma

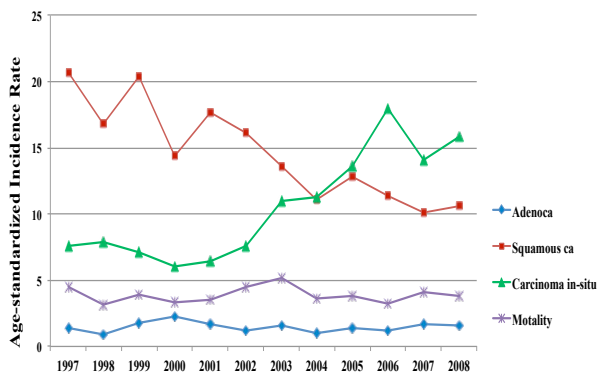


Figure 1. Cervix Uteri Cancer Age-standardized Incidence Rate by Histological Type and Mortality in 1997-2008

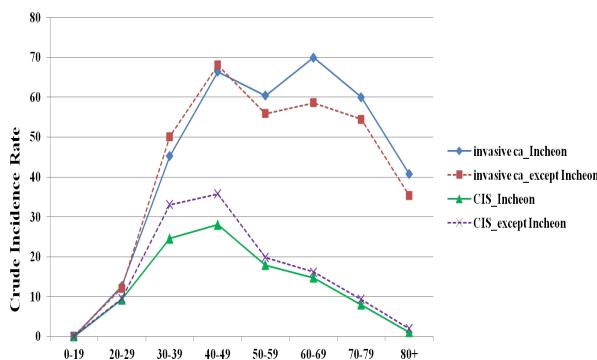


Figure 2. Age-specific Incidence Rate in Incheon Compared to Five Other Metropolitan Cancer Registries in Korea in 1997-2008

8.6% over the twelve year period. Figure 1 shows the incidence of invasive cervical cancer and CIS in Incheon according to the year. The incidence of squamous cell carcinoma has been decreasing rapidly over time, whereas CIS has been increasing. On the other hand, the incidence of adenocarcinoma had not changed markedly. The time trend incidence of the total ASR in uterine cervical cancer changed from 25.7 in 1997 to 13.4 in 2008, but incidence of CIS increased from 7.6 to 15.8. Cervix uteri accounted for 15.2% of all female cancers for twelve years. The ASR of uterine cervix cancer for twelve years in Incheon was 17.3 and the nation-wide incidence in Korea was 14.3. Uterine cervical cancer was the most common female cancer in 1997 in Incheon, but ranked 4th among all female cancers in 2008.

Figure 2 shows the age-specific incidence of cervix cancer during study period. The mean age of the patients with uterine cervix cancer in Incheon was forties. In invasive cancers, there were two peaks and the incidence rates were highest in those in their sixties and patients aged in their forties had the highest incidence of CIS. The incidence pattern was similar to the nation-wide data from other five metropolitan cities in Korea. However, the highest incidence rate of invasive cancer and CIS was their forties.

Figure 1 also shows the mortality of patients with invasive cervical cancer in Incheon. The mortality rate in ICR was 3.7 and KCCR was 3.2 from 1998 to 2002. Figures 3 and 4 show an international comparison of the

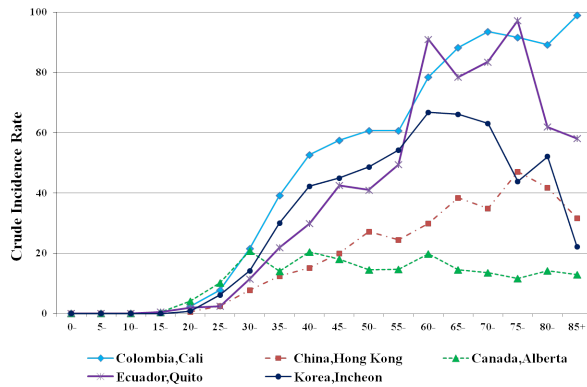


Figure 3. International Comparison of Annual Crude Incidence Rates for Cervix by Age Group Based on the Cancer Incidence in Five Continents Vol. IX(1998-2002)

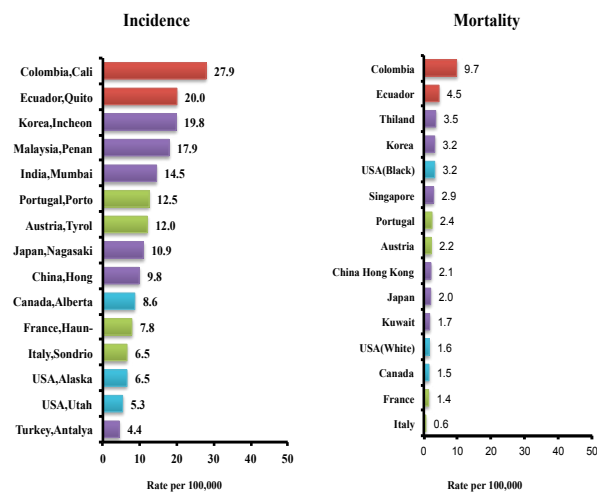


Figure 4. International Comparison of Incidence and Mortality Rates for Cervix Cancer Based on the Cancer Incidence in Five Continents Vol. IX(1998-2002)

uterine cervix cancer incidence, mortality and age-specific incidence based on CI-5 Vol.IX. Compared to other high risk countries, the peak incidence zone in the Incheon data was different. The developed countries have low incidence through all age group because they already established cancer screening program, but other registries which have high risk incidence of uterine cervical cancer show sharp increasing slope in their thirties.

Discussion

Uterine cervical cancer is the second most common cancer in women in worldwide (471,000 annual cases, 233,000 deaths) (Parkin, 2001). The highest rate was observed in Latin America and African districts. Although the rates of cervical cancer have been decreasing, it still has a higher percentage among all female cancers in the ICR and a higher ranking in the world (Jemal et al., 2010). China and Japan, which are located just beside Korea, have considerably a lower rates of cervical cancer than Korea.

The main histological type was squamous cell carcinoma in uterine cervical cancer because most cervical cancers occurred in the exocervix which is composed stratified squamous epithelium. On the other hand, adenocarcinoma and other histological subtypes were also identified. CIS is well known as a precancerous lesion. The declining incidence of female genital cancers, particularly squamous cell carcinoma of the cervix, has been a worldwide trend except in developed countries. Moreover, an improvement in the survival rate of patients was observed in Nordic countries(Klint et al., 2010).

Many articles have reported an increase in the incidence of adenocarcinoma of the uterine cervix.(Eifel et al., 1995; Smith et al., 2000; Wang et al., 2004; Missaoui et al., 2010). The ICR data also showed a decreasing tendency in squamous cell carcinoma but the incidence of adenocarcinoma has not been changed with time.

The mean age of the patients with uterine cervix cancer in Incheon was the fourth decade. This incidence and prevalence age group was similar in other cities in Korea (Figure 2). The age-specific incidence of invasive cancer in ICR data appears different from other developing and developed countries (Figure 3)(Sriamporn et al., 2003; Bhurgri et al., 2008). The incidence rates (ASR) of cervical cancer in selected cancer registries worldwide varied from less than 5 to more than 45. In countries with higher incidences, it was the leading cause of cancer death and premature death in women in 1998-2002 (Jemal et al., 2010).

The time trend mortality rate in the ICR data did not change markedly from 3.2 in 1998 to 3.8 in 2008, and it is not widely different from the KCCR data. Regular cancer screening using a PAP smear test allows the detection of precancerous lesions (Vizcaino et al., 2000; Bray et al., 2005; Mathew & George, 2009). Although several developed countries have already established cervical cancer screening programs, a program for those with a lower socioeconomic status based on the government program started in 1999 in Korea. Therefore, although the decreases in proportionate terms were much smaller than those in western countries until now, the trends in cervical cancer are expected to decline furthermore in the future.

A human papilloma virus (HPV) infection is the major risk factor for uterine cervix cancer (Bernal et al., 2008). Younger age at first sexual intercourse, multiple sexual partners, and low socioeconomic status are other risk factors. HPV vaccination for the prevention of uterine cervical cancer started in 2007 in Korea but is not widely used because of the high cost of the vaccine.

In conclusion, although the time trends in the incidence of invasive uterine cervix cancer for twelve years has been decreasing gradually, the incidence of CIS has increased over the same period. Compared to the nation-wide data from the KCCR, similar patterns of change were observed in Korea. Pathologically, the changing rate of squamous cell carcinoma was faster than that of adenocarcinoma. The mortality of cervical cancer has changed slightly. A cancer screening program in Korea has been activated recently, it is important to continue the monitoring

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