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Trends in Cervical Cancer Incidence in Iran from 2003 to 2009

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Abstract

Background: Cancer is the second leading cause of death worldwide and the third in Iran. Among cancers, cervical cancer is the third leading cause of death in women. Thus, recognizing the epidemiology and trends of cervical cancer can be effective for planning and policy-making. This study aims to investigate the incidence and trends of cervical cancer in Iran due to the few studies that have addressed this issue and the unclear trend for cervical cancer in Iran.

Methods: This study re-analyzed existing data from the cancer data recording system in Iran during years 2003 to 2009. We used available data from the National Cancer Registry and Center for Disease Control of the Ministry of Health, Treatment and Medical Education. Stata software (version 11) was used for data analysis and the significance of the incidence trend diagram was derived with WINPEPI software.

Results: Assessment of the National Cancer Registry statistics from 2003 to 2009 showed an increased trend in cervical cancer from 2003 to 2008 and a decreased trend from 2008 to 2009. During this period, there were 4273 cases of cervical cancer registered. From these, 394 cases were registered in 2003 which peaked at 907 cases in 2009. The registered cancer cases had an approximately 3-fold increase during this period. Most provinces reported an increased trend of incidence in cervical cancer.

Conclusion: Based on the results of this study, the incidence of cervical cancer is increasing in Iran, especially in the central regions of the country. Therefore, considering the growing trend of cancer, we recommend early detection through screening programs, public awareness, and public training programs that particularly target high risk populations.

Keywords: Cervical cancer, Trend of incidence, Epidemiology

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Introduction

Cancer is the second cause of mortality after cardiovascular diseases in developed countries, including the United States.[1] Among cancers, cervical cancer is the third most common tumor in women of the United States.[1] This disease is the seventh most common cancer and the sixth leading cause of cancer-related mortality in women and the first or second most common cancer of the female reproductive system in some parts of Africa, India, Central and South America, and South and South-East Asia. Worldwide, 500,000 patients develop this cancer and approximately 200,000 patients die from this cancer annually.[1] According to the World Health Organization (WHO), 85% of cervical cancer cases are from developing countries.[1] There is a considerable difference in the incidence and mortality rates of this disease between developed and developing countries.[2] The mean age of patients who suffer from this cancer is 52.2 years, while the peak age of incidence is between 50-55 years of age.[3,4] Smoking, multiple sexual partners, infection with human papilloma virus, and oral contraceptive pills (OCPs) are possible risk factors for cervical cancer.[5] Invasive cervical cancer is considered a preventable cancer due to the lengthy period before invasion, availability of an appropriate screening program, and treatment of early lesions.[6] This cancer accounts for 1.6% of cancer-related deaths in women and 15% of deaths due to gynecological cancers. Although cervical cancer has not been eradicated, there is a decline in incidence of invasive cases. Earlier diagnosis of cervical cancer cases has improved patient survival.[7] In a study by Madeleine et al., the increased risk of this disease in OCP users depended on the duration of OCP consumption. There was a 5-fold increased risk with more than 12 years of OCP use.[8] Foreign studies could not indicate the disease status in Iran. Although the cancer prevalence has appeared to be elevated in Iran, no study has assessed the trend of this important disease and changes in its incidence and epidemiology in recent decades. Most available studies were regional studies that have assessed small sample sizes. Epidemiologic data is necessary for successful planning. Therefore, this study aims to assess the trends in epidemiology of cervical cancer in Iran from 2003 to 2009.

Materials and Methods

We conducted this descriptive study using available data from the National Cancer Registry and Center for Disease Control (CDC) of the Ministry of Health, Treatment and Medical Education. After we received the data, CDC controlled the data in terms of proper coding, missing demographic information, and deletion of the repeated cases. In this study, all cases, registered since 2003 to 2009 in the whole country as well as the statistics of cervical cancer in all provinces have been studied. The direct incidence reported was then standardized according to the world health organization (WHO) standards. The collected data was accordingly investigated for the whole country based on the number of cases and standardized incidence rates for provinces. Extracted information for the entire country were studied based on the number of cases and standardized incidence rates for provinces. After gathering information about the disease trend during the study years, we determined the frequency and distribution of cervical cancer in the following regions:

Region 1: Tehran, Qazvin, Qom, Mazandaran, Semnan, Golestan.

Region 2: Bushehr, Isfahan, Fars, Charmahal-Bakhtiari, Hormozgan, Kohkiluye Boyer-Ahmad.

Region 3: Kurdistan, East Azerbayjan, West

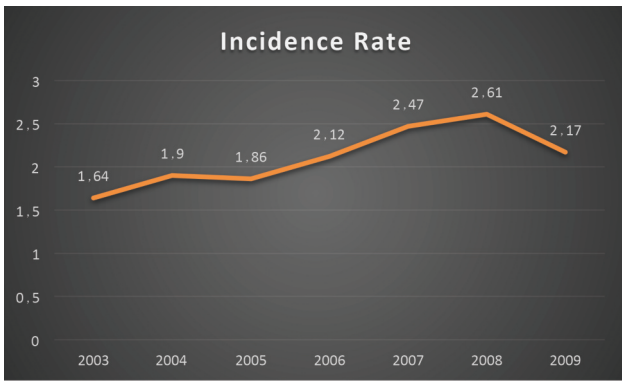

Figure 1. The trend in incidence of cervical cancer from 2003 to 2009 in Iran.

Table 1. The incidence of cervical cancer in Iran based on the Cancer Registry Center statistics.

Statistics of the Cancer Registry Center	Age-standardized rate (ASR)	Frequency (%)	Number of cases
2003	1.64	2.34	394
2004	1.9	2.3	466
2005	1.86	1.91	469
2006	2.12	2.04	530
2007	2.47	2.19	600
2008	2.61	2.68	907
2009	2.17	2.8	907

Azerbayjan, Guilan, Zanjan, Ardebil.
Region 4: Kermanshah, Hamadan, Lorestan, Ilam, Markazi, Khuzestan.
Region 5: Yazd, Sistan-Baluchestan, South Khorasan, Razavi Khorasan, North Khorasan, Kerman.

In order to evaluate the trends in incidence, we used Stata software (Version 11).

Results

Assessment of the National Cancer Registry statistics from 2003 to 2009 showed an increased trend for cervical cancer from 2003 to 2008 and a decreased trend from 2008 to 2009 (Figures 1,2). According to the statistics during this period, 4273 cases of cervical cancer were registered among Iranian women. We observed the most cases (907) in 2009, with the least in 2003 (394; Table 1). Cancer Registry statistics indicated that the highest incidence rate was 2.61 per 100,000 women in 2009; the least was 1.64 per 100,000 women in 2003. Table 2 shows the standardized incidence of cervical cancer during 2003-2009 among women from the 30 provinces according to the Cancer Registry statistics. Yazd Province had the highest incidence at 14.7 per 100,000 persons in 2009. Charmahal-Bakhtiari, Sistan-Baluchestan, and Kohkiluyeh Boyer-Ahmad in 2003; Sistan-Baluchestan and Ilam in 2004; South Khorasan in 2005; Ilam in 2008; and Kohkiluyeh Boyer-Ahmad in 2009 had no reports of cervical cancer in these provinces during the mentioned years (Table 2). The statistics showed that the central provinces had the highest incidence of cervical cancer with an increased trend in these provinces. The lowest incidence was reported in the southern areas of the country. In this study, we evaluated and compared the age-standardized incidence rate (ASR) of cervical cancer in five regions of the country (Figures 3, 4). The ASR for cervical cancer in all regions of the country increased, with the exception of the third (Kurdistan, East Azerbayjan, West Azerbayjan, Guilan, Zanjan, Ardebil) region which showed a decrease.

Discussion

Cervical cancer is one of the most common cancers among women in developing countries that has a worldwide prevalence.[4] The ASR for all cancers in Iran showed that the ASR for cervical cancer increased to a maximum age of 80-84 years, with a decrease after the age of 85. The cause for this decrease can be due to lack of patients' referral to diagnostic centers, lack of access of the elderly to diagnostic facilities, or lack of performing diagnostic tests by doctors at these ages. According to the studies conducted in Iran, cervical cancer includes 0.3% of all cancers in women. Cervical cancer is a common invasive cancer with variable rates of incidence and prevalence throughout different regions of the

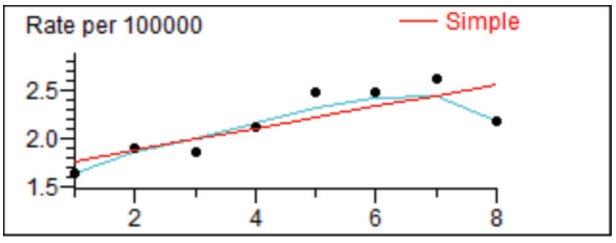

Figure 2. Significance of the variance trend for cervical cancer in Iran. [chi-sq = 0.07 (DF: 1) ; *P*=0.001]

Table 2. The standardized incidence for cervical cancer in Iranian provinces (2003 to 2009).

Province	2003 Female	2004 Female	2005 Female	2006 Female	2007 Female	2008 Female	2009 Female
East Azerbayjan	0.39	0.90	0.31	0.61	2.07	4.48	4.16
West Azerbayjan	0.72	1.78	1.98	0.73	0.97	2.59	2.54
Ardebil	0.21	2.50	2.08	2.12	1.38	1.63	1.46
Isfahan	0.92	2.64	2.78	2.84	1.28	5.59	5.99
Ilam	1.61	0.00	0.64	2.50	2.08	0.00	3.40
Bushehr	0.56	1.79	3.30	1.97	1.49	1.20	2.37
Tehran	4.24	2.56	3.02	1.95	2.72	6.72	5.84
Charmahal-Bakhtiari	0.00	1.47	1.86	1.23	1.84	0.74	1.23
South Khorasan	1.32	0.00	1.50	1.13	1.18	2.36	1.79
Razavi Khorasan			1.42	3.66	3.33	3.02	2.27
North Khorasan			0.85	0.90	3.18	0.42	0.75
Khuzestan	1.75	1.72	2.34	2.28	2.43	4.48	3.69
Zanjan	1.25	0.98	0.61	1.44	0.37	1.45	1.34
Semnan	2.43	3.40	2.30	1.52	3.04	3.54	4.87
Sistan-Baluchestan	0.00	0.00	0.43	0.27	0.51	0.55	1.29
Fars	1.50	1.13	2.32	1.58	4.10	4.04	3.51
Qazvin	0.86	1.21	2.51	1.47	2.06	1.93	2.18
Qom	0.65	0.88	3.31	2.07	2.39	1.40	1.67
Golestan	2.54	1.90	1.35	2.58	2.59	2.07	1.69
Guilan	2.02	1.90	2.44	1.85	1.69	2.86	3.15
Lorestan	1.19	0.87	1.67	1.76	2.49	2.56	2.49
Mazandaran	1.09	2.11	1.61	1.54	1.87	3.50	3.88
Markazi	0.00	0.74	2.41	1.33	2.06	2.03	5.43
Hormozgan	0.46	0.91	0.91	1.96	2.76	2.02	1.34
Hamadan	0.78	1.22	1.52	1.30	083	2.22	3.09
Kurdistan	0.19	1.03	2.04	1.89	2.24	3.05	2.62
Kerman	0.31	1.02	0.47	1.91	1.14	3.16	3.73
Kermanshah	0.87	1.22	1.95	1.50	1.08	2.60	2.21
Kohkiluye Boyer-Ahmad	0.00	1.44	0.50	0.45	0.67	0.99	0.00
Yazd	2.67	2.45	2.27	1.15	2.04	4.68	7.14

world.[4,5] In developing countries, cervical cancer is considered the most common cancer among women after breast cancer. In Asia, the lowest and highest ASR of cervical cancer are present in China with 3.2 per 100,000 women and Thailand at 23.8 per 100,000 women.[9,10] This rate is high in many provinces in Iran. In Europe, the lowest ASR for cervical cancer is seen in Albany

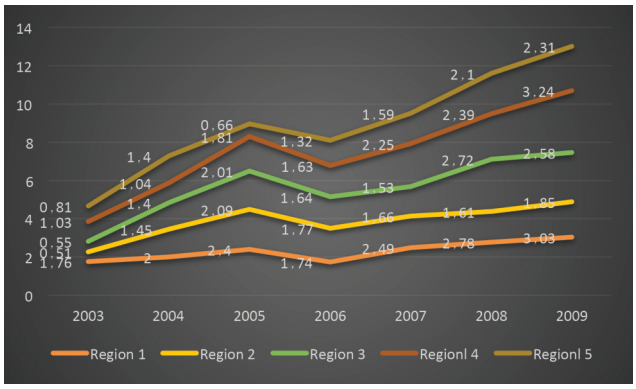

Figure 3. Trend of the age-standardized rate (ASR) for cervical cancer in five regions of Iran (2003-2009).

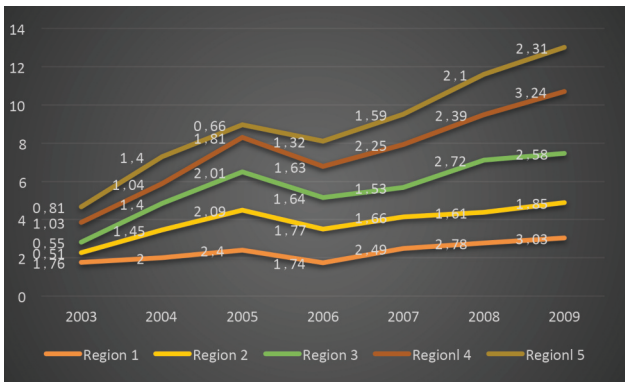

Figure 4. Average age-standardized rate (ASR) for cervical cancer in five regions of Iran (2003-2009).

(Southeastern Europe), (12.7 cases per 100,000 women) and the highest in the UK (44.2 cases per 100,000 women).[9,11] According to Mousavi et al., Iran had an ASR during 2005-2006 of 1.9 per 100,000 women.[12]

Table 2 shows that in 2003 the highest incidence of cervical cancer was in Tehran (4.24 per 100,000 women) and Yazd (2.67 per 100,000 women) during 2003. However, in 2003, Charmahal-Bakhtiari, Kohkiluyeh Boyer-Ahmad, and Sistan-Baluchestan provinces reported no cases of cervical cancer. These provinces had the lowest rates of this disease. In 2004, the highest incidence was observed in Semnan at 4.3 per 100,000 persons. The lowest incidence was noted in Sistan-Baluchestan and Ilam provinces, which had no reported cases of cervical cancer. These findings supported the results of the above-mentioned study. The results of a study by Smita Asthana et al. in India during 2008 showed that the incidence rate of cervical cancer had an increased trend from 2004 to 2008, which was consistent with the results of the present study. This has taken into consideration the dramatic increase of cervical cancer in less developed countries.[2, 13-15] In 2006, South Khorasan (3.66 per 100,000 persons) and Sistan-Baluchestan (0.27 per 100,000 persons) had the lowest incidence of this cancer. In 2007, Fars province had the highest rate of cervical cancer (4.10 per 100,000 persons), whereas Zanjan province had the lowest incidence rate at 0.37 per 100,000 persons. An assessment of the province incidence rates indicated an increasing trend in most areas of the country. This finding supported the results of a study by Almasi and Farahmand in Fars province.[16] In both 2007 and 2008, this cancer had a high incidence in most Iranian provinces. In 2008, the maximum incidence occurred in Tehran province (6.72 per 100,000 persons), followed by Isfahan (5.59 per 100,000 persons), East Azerbaijan, and Khuzestan (4.48 per 100,000 persons). In the same year (2007 and 2008), the lowest incidence was in Ilam province with no cases reported. In 2009, the highest incidence was in Yazd (7.14 per 100,000 persons), Isfahan (5.99 per 100,000 persons), and Tehran (5.84 per 100,000 persons) compared to Kohkiluye Boyer-Ahmad province that had the lowest incidence. No study has been conducted in Iran that compared the incidence rate in different provinces and regions and with the statistics from the Ministry of Health. In 2013, Kuji et al. conducted a study in Portugal, which showed that the mortality rate for cervical cancer was higher in developing countries; more than 85% of cervical cancer occurred in developing countries.[17] multiple studies have shown that the disease burden varies in different ethnicities and groups within a society. A study in 2013 conducted in China by Rijkaart et al. has confirmed the observation.[18] The incidence of cervical cancer is increasing according to studies conducted in other parts of the world and Iran. According to WHO reports, 529,000 new cases of this disease and 275,000 cases of cancer-related deaths occurred annually. The cervical cancer incidence has been growing in recent decades.[9,10,19] Studies by Xiaoyan Liu et al. in China in 2013 and Ferlay in the United States in 2010 confirmed these results.[8,21-24] One reason for the growing incidence of cervical cancer in Iran might be the shifting pattern of cervical cancer risk factors that include life-style changes in the population and changes in the prevalence of risk factors that lead to real changes in disease incidence. Another factor for the increased incidence may be the higher rates of diagnosis due to increased use of screening tests like Pap smears. Pap smears are being performed throughout Iran for at-risk populations. Another reason for this variation may be the different methods of data collection. Cancer registries have been population-based since 2006. Possible variations in diagnostic methods, and increasing their awareness about the importance of reporting cases, and other possible causes such as the cohort effect or age effect may be also effective.

Conclusion

In Iran, according to the National Cancer Registry Center statistics, cervical cancer has an increasing trend. The incidence of this cancer is higher in central regions compared to other areas

of the country. Hence, assessing the etiology in Iran, especially in the central provinces, seems necessary. We recommend that etiologic and pathologic studies, as well as ongoing programs be designed and implemented to increase public awareness. According to the results, the programs of the above-mentioned regions for reduction of human papillomavirus infection could possibly be effective in fighting cancer. However, implementing extensive screening programs and vaccination against human papillomavirus in teenage and young girls needs additional study to determine its cost-effectiveness.

Conflict of Interest

No conflict of interest is declared.

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