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Original Article

Trends in Leading Cancer Incidence among Iranian Women: Annual Cancer Registry Reports, 2003-2015

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Abstract

Background: Cancer is one of the most important causes of death in the world and has an increasing trend globally. We aimed at investigating the five leading cancers in Iranian women based on a 10-year history of cancer registry reports and illustrating the trends in all cancer sites and breast cancer as the top leading one from 2003 to 2015.

Methods: Data were obtained from national cancer registry study. Age-Specific Incidence Rate (ASR) data were obtained from Iran's annual national cancer registry reports between 2003 to 2010 and 2014 to 2015. Using Joinpoint regression, we analyzed incidence trends over time for all cancer sites and the top leading cancer from 2003 to 2015.

Results: Breast cancer was ranked first in Iranian women. Its ASR raised from 15.96 in 2003 to 32.63 in 2015. Results of trend analysis based on Annual Percent Change (APC) index showed 5.6 (95%CI: 2.9 to 8.3) and 4.6 (95%CI: 2.0 to 7.2) annual increase in the incidence of all cancer sites and breast cancer from 2003 to 2015, respectively.

Conclusion: This study indicates significant increasing trends in all cancer sites and breast cancer incidence in Iran. Despite the national coverage of cancer registry over the past decade, more considerations should be taken into account, especially in Breast cancer.

Keywords: Cancer trend; Annual percent change; Cancer registry; Cancer statistics; Breast cancer

Introduction

Cancer is one of the most important causes of death in the world with 18.1 million new cases and 9.8 million deaths in 2018, which more than two-thirds of it occurs in low-income and middle-income countries (1, 2). It has an increasing trend globally, due to factors such as population growth, aging, lifestyle changes and socioeconomic status (3-5). In fact, nearly 27.5 million new cancer cases detected in 2040 (6). Over the past decade, with increasing urbanization, technological development, relative control of infectious diseases, reduction of child mortality rates, population ageing, population growth in the elderly, and increased life expectancy, we are witnessing a change in the causes of death in a way that cancer is currently the third cause of death in Iran (7-9). Breast cancer is one of a concerning issue in women's health as well. Although deaths from breast cancer have decreased over time, it

remains the second leading cause of cancer death among women overall (10).

Early detection, diagnosis and treatment of cancer could save patients' life and other costs. Cancer registries are an essential infrastructure to provide robust and unbiased data to help prevent and control cancer (11-13). According to the diagnostic centers in Iran, cancer registry began in 1986 as the pathology-based registry. Population-based cancer registry has gradually started in 2005 and developed throughout the country in 2007 (14). Due to the limitations of the pathology-based cancer registry in the detection of some cancers, population-based cancer registry was introduced as its complementary (13).

The purpose of this study was to investigate the trend in the top cancers based on a 10-year history of cancer registry reports in Iranian women. We also exclusively have a focus on breast cancer in this population and provide some facts.

Methods

Data Source

Data were obtained from national cancer registry study. Cancer incidence data were obtained from the cancer registry reports in Iran from 2003 to 2015. Population-based cancer registry in Iran is conducted by (i) diagnosis centers (including pathology and cytology centers); (ii) treatment centers (medical records of hospitals); (iii) and from death certificate. At present 56 universities in Iran are collaborating in this project. Each university has one deputy of health, which is responsible for the health of its cover area population. The deputy of health after gathering the cancer records from pathology centers, hospitals and other centers, transferred the records to the ministry of health every 3 months through the electronic file until 2010 (14, 15). At this level, the process of omitting, duplicating and correcting the codes was done in cancer office at the ministry of health by manual review. From 2011 to 2013, despite the collection of cancer registry data and the submission to the ministry of health, there were no duplicating and the final report on the data.

Since 2014, with the advancement of cancer registry and online system design, cancer cases were placed in a nationwide integrated cancer system through each university (15). In this International Agency for Research on Cancer (IARC)-check system, duplicating and correcting the codes are conducted online by the universities and ultimately the data is sent to the Ministry of Health. The cancer coding was also done according to the International Classification of Disease for Oncology (ICD-O) (16).

Statistical analysis

This study was based on an analysis of the country's cancer registry report from 2003 to 2010 and 2014 to 2015. We reported the Age-Standardized Rate (ASR) per 100,000 persons. Direct adjustment method was used for computing the ASR. The world population was also applied for standardization (17). ASR time trends were estimated by Joinpoint regression model using the Joinpoint Regression Program software, ver. 4.7.0.0. The logarithmic transformation of the ASR was used to estimate the trends (18). Annual Percentage Change (APC) of all cancer sites and also breast cancer were estimated from 2003 to 2015.

Ethical Approval

This study was extracted from the national cancer registry reports, ethical approval not required.

Results

Tables 1 and 2 show the number of cases, ASR and crude rate of all cancer sites and breast cancer by the year of the registry and in different age groups, respectively. It was denoted the number of cases and ASR of all cancer sites has risen from 16849 (ASR=69.6) in 2003 to 51162 (ASR= 135.54) in 2015 in Iranian women (Table 1). The number of cases and ASR for breast cancer were 3946 (15.96) in 2003 and raised to 12802 (32.63) in 2015 (Table 2).

Table 3 shows the number of cases and ASR of top cancers in Iranian Women. It has been sorted by the number of cases throughout the years. Breast cancer was ranked first in this population over the years. Besides, skin and colon and rectum placed at the second and third, alternatively.

Results of Joinpoint regression analysis showed a significant increasing trend of all cancer sites and breast cancer in Iranian women from 2003 to 2015. APC index was estimated 5.6 (95%CI: 2.9 to 8.3) and 4.6 (95%CI: 2.0 to 7.2) for all cancer sites and breast cancer, respectively, which were significantly different from zero (2-sided t-test; $P<0.05$), (Fig. 1).

Fig. 2 illustrates the age distribution of breast cancer over the years. Maximum ASR for breast cancer was at the age group of 45-49 yr in 2003, it transited to 60-64 yr in 2015.

Table 3: Top five cancers by the number of cases and percent in Iranian women from 2003 to 2015

	Breast	*Skin*	*Colon and Rectum*	*Stomach*	*Esophagus*
		2296(10.05)	1269(5.47)	1166(5.2)	1093(4.93)
2003	3946[1](15.96)[2]				
	Breast	Skin	Colon and Rectum	Stomach	Esophagus
2004		2779(12.01)	1558(6.64)	1439(6.42)	1192(5.41)
	4557(18.24)				
	Breast	Skin	Colon and Rectum	Stomach	Esophagus
2005		3162(13.16)	1801(7.4)	1624(6.74)	1429(6.12)
	5981(23.16)				
	Breast	Skin	Colon and Rectum	Stomach	Esophagus
2006		3290(13.85)	1967(8.17)	1603(6.65)	1403(6.07)
	6456(25.06)				
	Breast	Skin	Colon and Rectum	Stomach	Esophagus
2007		3403(14.51)	2127(8.85)	1735(7.38)	1412(6.14)
	6976(27.15)				
	Breast	Skin	Colon and Rectum	Stomach	Esophagus
2008		3696(15.77)	2658(11.12)	2353(10)	1782(7.77)
	8424(33.21)				
	Breast	Skin	Colon and Rectum	Stomach	Esophagus
2009	7582(28.55)	3333(13.09)	2783(10.89)	1995(7.78)	1449(5.88)
	Breast	Colon and Rectum	Stomach	Skin	Leukemia
2010	8069(30.21)	2641(10.34)	2238(8.85)	2118(12.41)	1484(5.35)
	Breast	Colon and Rectum	Skin	Stomach	Thyroid
2014	13120(34.53)	4217(11.86)	4054(11.66)	3348(9.44)	2912(6.98)
	Breast	Colon and Rectum	Skin	Thyroid	Stomach
2015	12802(32.63)	4337(11.79)	3935(10.96)	3259(7.45)	3179(8.68)

[1]Number of cancer cases, [2]ASR per 100,000 population

Discussion

This study illustrated a significant increasing trend of all cancer sites and breast cancer incidence in Iranian women population. Breast cancer was also ranked first among other leading cancers. Globally, breast cancer is the most prevalent cancer among women, affecting 2.1 million women per year. In 2018, nearly 15% of all cancer deaths was related to breast cancer. While breast cancer rates are high among women in more developed countries, rates are growing in almost all regions (19, 20). According to the annual report to the nation on the status of cancer in the US, although the trend of all cancer sites remained stable in the US women, 5-year breast cancer trend significantly increased (ASR=125.6, APC=0.4) and considered as the most frequent cancer among them (21).

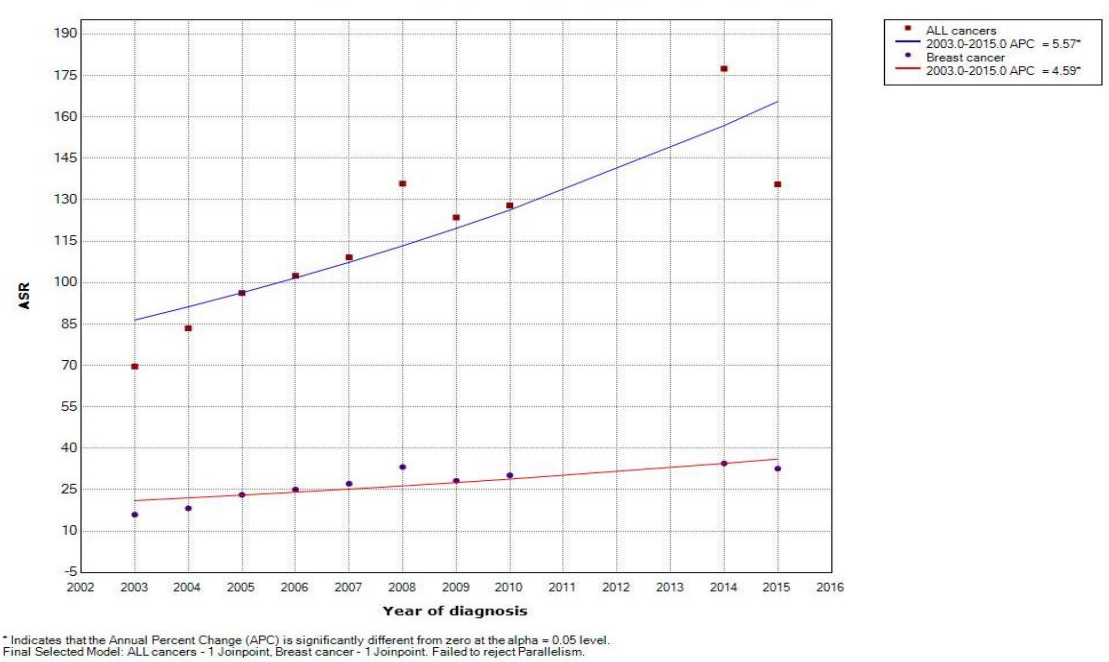

Fig.1: All cancer sites and breast cancer trends in Iranian women from 2003 to 2015

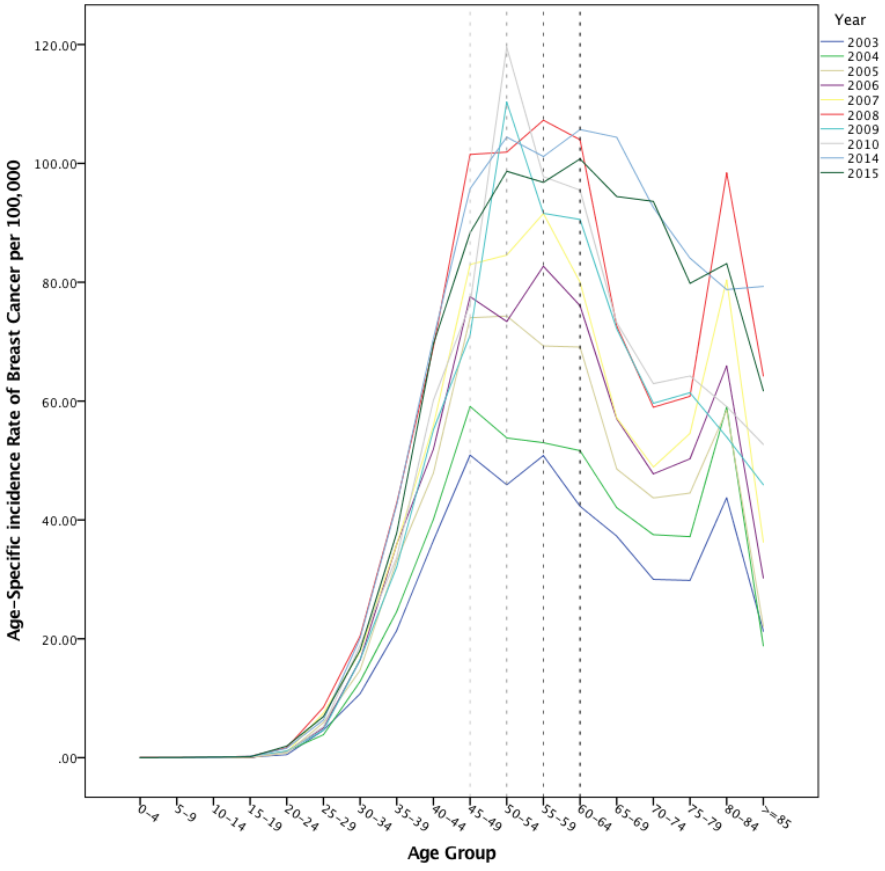

Fig. 2: Age distribution of breast cancer in Iranian women from 2003 to 2015

Our results were in line with these statistics (ASR=32.6, APC=4.6) denoting significant breast cancer raise in Iranian women as well. Investigating cancer registry reports in Iran showed that the number of all cancer sites and also breast cancer in women increased by nearly 2-fold from 2003 to 2015, which could be due to the better coverage of cancer registry. Loads of literature consider factors that could have effect on risk of breast cancer, most of them considered lifestyle and reproductive factors as modifiable risk factor for breast cancer (22-26).

Studies showed incidence rates were higher in socioeconomically well-developed countries. Known risk factors such as postponement or avoidance of childbearing, use of hormonal contraception and replacement therapy, changes in menstrual history and obesity could be affective (27). According to the Surveillance, Epidemiology and End Results (SEER) reports in 2019, the median age at the time of breast cancer diagnosis was estimated 62 (28, 29). Although our study reveals a transition of higher ASR of breast cancer from age group 45-49 in 2003 to 60-64 in 2015 (Fig. 2), Iranian breast cancer patients are still relatively younger than their western counterparts (30, 31), so early detection of breast cancer should be an important issue to health policymakers (31, 32).

Our evidence was in line with some other Middle East countries reported statistics as well (33, 34). While the profitable effects of screening will proceed to increase, it is apparent that improvements in the control of breast cancer have a major effect, and the development of high-quality care services should be taken in to account.

The major strength of this study is the high population coverage of cancer incidence data for the Iranian Women population and providing some cancer statistics in this population for ten years. A limitation of this study was the unavailability of data from 2011 to 2013. Owing to the limitation of the data record, from 2011 to 2013 due to some problems with the preparation of the online registration infrastructure and the launch of the population-based cancer registry in a new approach, no cancer record was reported.

Conclusion

This study indicates significant increasing trends in all cancer sites and breast cancer incidence in Iran. Despite the national coverage of cancer registry over the past decade, more considerations should be taken into account, especially in Breast cancer.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflicts of interest

The authors declare that they have no conflict of interest.

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Table 1: Annual history of age-specific incidence rate of All Cancer Sites per 100,000 in Iranian women

Year	*N*	*%*	*0-4*	*5-9*	*10-14*	*15-19*	*20-24*	*25-29*	*30-34*	*35-39*	*40-44*	*45-49*	*50-54*	*55-59*	*60-64*	*65-69*	*70-74*	*75-79*	*80-84*	*>=85*	*Crude*	*ASR*
2003	16849	100	3.48	2.81	3.59	5.80	10.90	19.40	32.80	51.60	84.40	130	160	197	258	276	324	326	532	170	52.05	69.60
2004	20473	100	5.74	4.08	4.71	8.01	14.70	22.30	38.81	60.10	96.60	153	189	237	320	316	378	408	660	233	62.17	83.42
2005	24498	100	6.17	3.83	4.76	8.68	16.8	26.7	43.9	74.2	109	176	233	278	361	356	428	463	760	265	71.42	96.18
2006	26016	100	7.66	4.40	5.46	9.34	17.40	29.31	45.50	79.40	113	188	237	312	368	379	443	514	837	379	76.15	102.43
2007	27404	100	8.90	4.92	5.07	8.07	18.5	31.8	49.3	80.6	121	205	257	340	405	362	465	549	949	408	80.21	109.18
2008	33880	100	9.49	6.87	5.59	10.30	21.70	41.91	59.11	99.21	118	241	306	430	507	473	561	694	1262	638	99.17	135.80
2009	32898	100	10.0	6.38	7.28	10.01	16.49	28.61	51.66	81.81	131.68	189.11	364.58	364.81	447.21	469.38	535.19	704.04	804.87	546.64	95.86	123.55
2010	33786	100	10.88	7.59	6.76	7.73	15.12	29.20	57.09	82.39	135.04	186.72	369.42	384.13	462.39	488.34	543.93	763.58	873.03	688.19	98.71	127.94
2014	60432	100	21.20	15.05	12.28	18.10	23.14	28.78	39.68	53.78	84.44	130.95	251.59	415.31	669.00	992.66	1267.44	1654.59	2160.56	1908.21	156.56	177.44
2015	51162	100	16.47	11.63	11.20	15.79	23.93	38.11	60.67	94.89	154.73	205.73	273.01	332.51	458.01	547.09	696.89	833.97	1063.22	953.57	132.90	135.54

Table 2: Annual history of age-specific incidence rate of Breast Cancer per 100,000 in Iranian women

Year	*N*	*%*	*0-4*	*5-9*	*10-14*	*15-19*	*20-24*	*25-29*	*30-34*	*35-39*	*40-44*	*45-49*	*50-54*	*55-59*	*60-64*	*65-69*	*70-74*	*75-79*	*80-84*	*>=85*	*Crude*	*ASR*
2003	3946	23.42	0.00	0.00	0.00	0.11	0.50	4.63	10.76	21.43	36.53	50.91	45.91	50.83	42.30	37.28	30.00	29.84	43.73	21.28	21.28	15.96
2004	4557	22.26	0.00	0.00	0.00	0.02	1.08	3.86	12.82	24.62	40.10	59.10	53.80	53.00	51.66	42.06	37.52	37.18	59.02	18.83	13.84	18.24
2005	5981	24.41	0.00	0.00	0.00	0.02	0.78	5.91	14.74	33.14	47.90	74.03	74.31	69.28	69.09	48.58	43.71	44.53	58.45	22.09	17.44	23.16
2006	6456	24.82	0.00	0.00	0.00	0.00	1.01	5.01	16.43	35.93	51.91	77.57	73.39	82.69	76.04	57.01	47.75	50.29	65.91	30.25	18.90	25.06
2007	6976	25.46	0.00	0.00	0.02	0.08	0.90	7.48	17.82	35.88	55.90	82.98	84.57	91.57	79.99	57.18	48.91	54.57	80.36	36.29	20.42	27.15
2008	8424	24.86	0.04	0.03	0.13	0.21	1.68	8.47	20.47	42.87	69.06	101.51	101.90	107.26	103.97	72.65	58.97	60.81	98.41	64.25	24.66	33.21
2009	7582	23.05	0.00	0.00	0.09	0.22	1.10	4.63	16.50	32.11	55.16	71.10	110.33	91.59	90.56	72.16	59.64	61.41	53.96	45.93	22.09	28.25
2010	8069	23.88	0.00	0.00	0.03	0.09	0.90	5.24	18.96	33.70	60.14	76.29	119.52	97.76	95.49	73.20	62.94	64.23	59.07	52.71	23.51	30.21
2014	13120	25.41	0. 00	0.00	0.04	0.21	1.59	6.35	20.09	42.61	70.56	95.74	104.43	101.15	105.69	104.39	92.57	84.05	78.76	79.29	34.49	34.53
2015	12802	25.02	0.00	0.03	0.11	0.14	1.95	6.91	18.09	37.83	69.59	88.32	98.67	96.80	100.75	94.42	93.61	79.81	83.14	61.73	33.26	32.63