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Trends in the Incidence of Cancer in Iran (2003 - 2009)

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Abstract

Background: Cancer is a leading cause of death throughout the world. Increasing life expectancy and aging population are important factors for increasing cancer incidences in developing countries. National programs are essential for prevention and control of cancer in any society.
Objectives: This study aimed to investigate cancer incidence and trend of its changes in Iran.
Methods: National incidence was rated by Iran national cancer registry data derived from Iran's annual national cancer registration reported from 2003 to 2009. The crude rate and age standardized rate were used to express the incidence of cancer. Cochrane Armitage test was used for linear trend by Winpepi software 2.1 to study the trends in cancer incidence.
Results: Based on the results of this study, the incidence of cancer was rising in Iran from 2003 to 2009 and the sex ratio was more in men than women. During this time a total of 413591 cases of cancer have been registered in the country. Of the incidence cases, 231572 cases were males and 182019 were females.
Conclusions: This study indicated remarkable increasing trends in cancer incidence. According to changing lifestyles and dietary habits, it is possible that in the coming years we will be faced with a higher incidence of cancer in the country, Therefore, it is recommended to promote the use of screening programs and to increase awareness of the population to reduced the incidence of cancer in the country.

Keywords: Cancer, Epidemiology, Incidence, Trends

1. Background

Cancer is defined as rapid development of abnormal cells that can spread to other organs. Cancer is the second leading cause of death worldwide, that is 7.6 million people annually lose their lives due to cancer and 70% of those are related to middle and low income countries (1-3). Cancer is a worldwide problem; millions of patients are diagnosed with different types of cancer throughout the world every year. More than half of the patients with cancer in the world present in developing countries (4). The incidence of cancer is rising in developed countries (5). According to the last report of the Globocan project, there were 14.1 million new cancer cases, 8.2 million cancer deaths, and 32.6 million individuals living with cancer worldwide in 2012 (4). It is estimated that by year 2030, the number of new cancer cases and that of deaths by cancer will reach 26.4 million people and 17 million people, respectively (6). About 44% of new cancer cases and 53% of the cancer deaths occurred in countries at a low or medium level of the Human Development Index (7).

Cancer is a major public health problem in Iran as well. Based on recent reports from the ministry of health and medical education (MOHME); it is the third cause of death in Iran after coronary heart disease and accidents (8), and Stomach cancer is the first and second cause of mortality from cancer in men and in women respectively (9). It is estimated that more than a quarter of a million people will die yearly in the eastern mediterranean region (EMRO) alone. Iran is a member of the EMRO. The most common cancers in the EMRO are breast cancer in females, and lung and bladder cancers in males (10, 11). The incidence of cancer is different in various countries. Age specific incidence rate for all cancers in the world was 205.4 (per 100,000 population) and mortality rate was 126.3 per 100,000 population in 2012; this rate was respectively 174.1 and 126.3 in the Asia and also was 134.7 and 90.4 in Iran (4).

Ten common cancers in men in the world included lung, prostate, pancreas, lymph nodes, hematopoietic sys-

tem, esophagus, stomach, bladder, kidney, and throat, but in women were lung, breast, pancreas, lymph nodes, hematopoietic system, stomach, cervix, kidney, rectum, and bladder (12). According to the report of cancer registry center, ten most common cancers in the country (Iran) are skin, stomach, breast, colorectal, bladder, esophagus, hematopoietic glands, prostate, lymph nodes, and lung (8). Geographical differences in the cancer incidence lead to be important to conduct an epidemiological study of the disease. It is possible to find significant differences between developed and developing countries according to prevalence of cancers (12).

Epidemiologic transition and increasing trend of noncommunicable disease such as cancer, cause countries have sought a planning for control of cancer, in order to respond to the cancer needs in populations by preventing, detecting early, curing and caring. Cancer control strategy allows for a more balanced, efficient and equitable use of limited resources. In lower resource settings such as our country, a plan that considers a primary health care approach and the gradual implementation of few, affordable, cost-effective interventions will have a better chance of moving into effective action (13). The primary purposes of cancer control programs are early detection, effective treatment, and palliative care programs, in which target population is not limited to certain age, sex, ethnicity, and race (3). Knowing the statistics of cancer and its trend is effective.

2. Objectives

Cancers are the third cause of death in Iran after cardiovascular diseases and accidents according to research performed in the country. A difference in cancer incidence changes is remarkable in the country, which is consistent with global patterns. Hence, planning for prevention and control of the disease is a medical necessity that requires investigating trends of cancer in the past. This study aimed to investigate cancer incidence and trend of its changes in Iran.

3. Methods

This was a study extracted from Iran national cancer registry published data derived from Iran's annual national cancer registration reported from 2003 to 2009 (Islamic Republic of Iran ministry of health and medical education, center for disease control and prevention, noncommunicable deputy cancer office, 2009) (8). The Iranian Ministry of health and medical education registers all the new cancer cases, according to pathology reports, in all provinces and the data are publicized after revision. Age standardized rate (ASR) and crude incidence rate (CIR) of Cancer for men and women from 2003 to 2009 were expressed per 100,000 as the annual incidence, overall and for all provinces. Data extracted was investigated according to the number of cases and the standardized incidence rate for both sexes, sex ratio in each province and the country. Then, trends of the disease during years studied in both sexes were determined and distribution of cancer frequency was drawn in terms of the provinces. The data were recorded according to ICD-O (14). The registered cases included all invasive cancers in ICD-10 categories of C-00 to C-80.

Excel 2010 software was used for charting. Cochrane Armitage test was used for linear trend by Winpepi software 2.1 to study the trends in cancer incidence.

4. Results

Findings obtained from the national registry system of cancer showed that the incidence of cancer had an increasing trend from 2003 to 2009 (Figures 1 and 2). During this time 413591 cases of cancer have been registered in the country. Of the incidence cases, 231572 (56%) cases were male and 182019 (44%) were female and sex ratio (male to female) for cancer was 1.27 in these years. The highest incidence rate (76159 cases) was observed in 2008, but the lowest rate (38469 cases) was recorded in 2003 (Table 1).

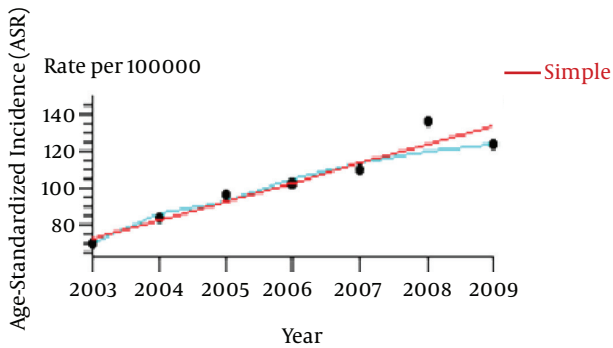

Figure 1. Trend of Cancer Incidence Among Women in Iran 2003 - 2009

In this study, the age-specific rate was different in age groups so that as age rises, the incidence of cancer in men and women increased, and the highest rate was observed at 80–84 years but it decreased at above 85 years. Furthermore, the overall age-specific rate has rising trends from 2003 to 2008 (Table 2).

The highest incidence rate of cancers in males was 208 per 100,000 people in the province of Semnan in 2008 and

Table 1. The Incidence Rate of Cancers in Both Men and Women in Iran from 2003 to 2009

Years	Frequency (%)			CIR		ASR		Male: Female
	Total	Female	Male	Female	Male	Female	Male	
2003	38469	16849	21620	52.05	63.38	69.60	77.71	1.28
2004	47217	20474	26743	62.17	77.07	83.42	95.43	1.30
2005	55853	24498	31355	71.42	86.75	96.18	108.10	1.27
2006	59786	26016	33770	76.15	93.80	102.43	117.27	1.29
2007	62040	27404	34636	80.21	96.21	109.18	121.62	1.26
2008	76159	33880	42279	99.17	117.44	135.80	148.75	1.24
2009	74067	32898	41169	95.86	104.67	123.55	132.19	1.25
Total	413591	182019	231572					1.27

Table 2. The ASR according to Age Group and Gender

Age-Category	2003		2004		2005		2006		2007		2008		2009	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
0 - 4	3.48	4.76	5.74	5.96	6.17	7.13	7.66	9.61	8.90	10.00	9.49	10.3	10.00	10.09
5 - 9	2.81	3.28	4.08	5.13	3.38	5.16	4.4	7.35	4.92	7.48	6.87	8.83	6.38	9.70
10 - 14	3.59	4.32	4.71	4.99	4.76	5.19	5.46	6.01	5.07	5.87	5.59	7.11	7.38	7.85
15 - 19	5.81	8.4	8.01	9.40	8.68	9.89	9.34	10.6	8.07	10.6	10.3	12.8	10.01	10.84
20 - 24	10.9	12.1	14.7	16.4	16.8	19.1	17.4	21.3	18.5	21.8	21.7	23.5	16.49	14.83
25 - 29	19.4	13.5	22.3	18.4	26.7	22	29.3	24.2	31.8	24.7	41.9	30.7	25.61	21.03
30 - 34	32.8	24.4	38.8	31.7	43.9	30.3	45.5	31.8	49.3	29.6	59.1	39.2	51.66	30.89
35 - 39	51.6	32.7	60.1	38.5	74.2	42.4	79.4	47.8	80.6	47.00	99.2	59.1	81.81	41.99
40 - 44	84.4	56.1	96.6	69.4	109	73.7	113	78.5	121	77.5	148	94.7	131.68	69.48
45 - 49	130	82.3	153	106	176	108	188	123	205	129	241	151	189.11	117.97
50 - 54	160	195	189	241	233	278	237	302	257	305	306	381	364.58	228.69
55 - 59	197	199	237	247	278	284	312	330	340	366	430	458	364.81	390.76
60 - 64	258	250	320	299	361	349	368	356	405	362	507	441	447.21	529.35
65 - 69	276	338	316	404	356	429	379	434	362	443	473	505	469.38	655.01
70 - 74	324	565	378	691	428	823	443	851	465	847	561	1025	535.19	844.94
75 - 79	326	580	408	654	463	740	514	817	549	876	694	1117	704.04	1166.40
80 - 84	532	967	660	1280	760	1610	837	1710	949	1884	1262	2345	804.87	1615.66
+ 85	170	419	233	520	265	578	379	814	405	936	638	1261	546.64	1060.99

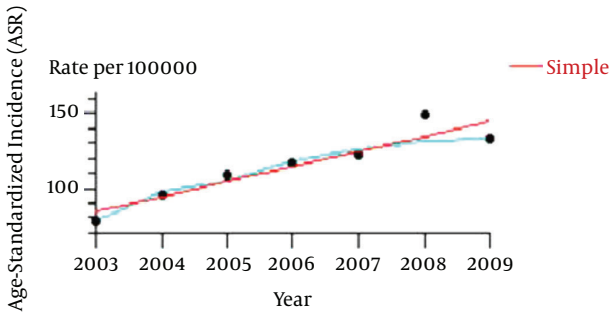

Figure 2. Trend of Cancer Incidence Among Males Iran 2003 - 2009

the lowest was 11 per 100,000 people in Kohkilooyeh and Boyer Ahmad in 2003. The highest incidence rate of cancers in females was 188 per 100,000 people in the province of Semnan in 2008 and the lowest was 3 per 100,000 people in Kohkilooyeh and Boyer Ahmad in 2003. Table 3 shows the incidence rate of cancers according to sex and province.

5. Discussion

This study, indicated a remarkable increasing trend in cancer incidence, based on the national registry data from 2003 to 2009. This trend was different for men and women. Enhanced detection could contribute to the increased cancer incidence in the past decades, but cannot fully explain

Table 3. Age -Standardized Incidence Rate in the Nation from 2003 to 2009

	2003		2004		2005		2006		2007		2008		2009	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
East Azarbaijan	22.0	19.0	97.0	68.0	50.0	42.0	50.0	35.0	147.0	120.0	171.0	154.0	161.0	135.0
West Azarbaijan	92.0	59.0	117.0	84.0	118.0	83.0	111.0	84.0	119.0	98.0	106.0	87.0	125.0	97.0
Ardebil	61.0	44.0	114.0	95.0	74.0	56.0	113.0	90.0	81.0	72.0	135.0	105.0	124.1	99.0
Esfahan	79.0	69.0	110.0	92.0	113.0	105.0	127.0	115.0	131.0	124.0	144.0	135.0	154.0	159.0
Elam	38.0	39.0	64.0	72.0	43.0	41.0	80.0	71.0	106.0	70.0	98.0	75.0	78.0	67.0
Bushehr	33.0	36.0	58.0	53.0	69.0	63.0	70.0	71.0	72.0	83.0	79.0	83.0	76.0	83.0
Tehran	136.0	140.0	71.0	77.0	93.0	92.0	106.0	102.0	99.0	100.0	192.0	183.0	156.0	164.0
Chahar Mahal Bakhtiari	37.0	65.0	83.0	108.0	87.0	70.0	105.0	70.0	115.0	78.0	111.0	87.0	96.0	83.4
South Khorasan	100.0	95.0	109.0	103.0	67.0	68.0	54.0	54.0	67.0	62.0	86.0	95.0	84.0	75.0
Khorasan Razavi	100.0	95.0	109.0	103.0	83.0	78.0	144.0	123.0	134.0	123.0	153.0	138.0	150.0	126.0
North Khorasan	100.0	95.0	109.0	103.0	73.0	62.0	40.0	34.0	79.0	57.0	93.0	86.0	104.0	73.0
Khuzestan	53.0	50.0	79.0	67.0	67.0	68.0	81.0	82.0	118.0	89.0	154.0	156.0	134.0	140.0
Zanjan	63.0	44.0	83.0	59.0	93.0	63.0	94.0	69.0	108.0	72.0	95.0	73.0	96.0	60.0
Semnan	58.0	57.0	83.0	70.0	71.0	85.0	107.0	91.0	119.0	98.0	208.0	188.0	118.0	139.0
Sistan and Baluchestan	16.0	19.0	19.0	22.0	30.0	25.0	33.0	31.0	35.0	34.0	35.0	34.0	36.0	35.0
Fars	66.0	61.0	70.0	62.0	87.0	76.0	95.0	90.0	140.0	124.0	140.0	129.0	134.0	130.0
Qazvin	96.0	71.0	100.0	80.0	95.0	95.0	104.0	88.0	108.0	91.0	121.0	110.0	107.0	102.0
Qom	63.0	57.0	94.0	67.0	75.0	68.0	93.0	75.0	90.0	81.0	97.0	90.0	61.0	58.0
Golestan	51.0	54.0	79.0	70.0	75.0	70.0	99.0	81.0	90.0	85.0	97.0	90.0	100.3	82.0
Gillan	56.	44.0	85.0	61.0	118.0	105.0	112.0	95.0	130.0	112.0	149.0	126.0	143.0	107.0
Lorestan	46.0	42.0	89.0	68.0	74.0	67.0	87.0	69.0	97.0	85.0	140.0	119.0	114.0	96.0
Mazandaran	80.0	60.0	105.0	77.0	107.0	88.0	113.0	105.0	100.0	100.0	146.0	142.0	143.0	119.0
Markazi	50.0	39.0	72.0	51.0	80.0	66.0	87.0	79.0	91.0	85.0	106.0	81.0	180.0	152.0
Hormozgan	20.0	19.0	45.0	42.0	40.0	38.0	47.0	52.0	50.0	53.0	54.0	59.0	38.0	53.0
Hamedan	63.0	42.0	73.0	48.0	89.0	75.0	106.0	89.0	113.0	90.0	157.0	112.0	132.0	115.0
Kurdistan	61.0	68.0	93.0	93.0	106.0	73.0	114.0	82.0	118.0	89.0	171.0	139.0	139.0	125.0
Kerman	60.0	59.0	75.0	73.0	71.0	62.0	86.0	83.0	79.0	79.0	104.0	92.0	132.0	128.0
Kermanshah	88.0	75.0	93.0	78.0	97.0	81.0	92.0	81.0	120.0	113.0	138.0	122.0	114.0	123.0
Kohkilooyeh Boyer	11.0	3.0	105.0	63.0	70.0	39.0	88.0	64.0	105.0	71.0	98.0	76.0	120.0	80.0
Yazd	113.0	110.0	108.0	100.0	106.0	110.0	113.0	113.0	117.0	120.0	159.0	168.0	159.0	173.0

the increase, suggesting a true increase. The low incidence rate of cancer in 2003 was not due to the fact that few cancer cases occurred, but rather owing to the incomplete registration of cancer cases at the beginning of the cancer registry program and the trend could also be increasing due to the development of cancer registration program(s).

In this study, most patients were males (56%) and sex ratio was 1.27 (male to female). The sex ratio of cancer incidence in other studies were high in male patients. Maisinneuve and Lowenfels reported that the prevalence of cancer was twice in men than it was in women (15). Studies performed in Belgium in 2003, Canada, the United States, and Western Europe indicted consistent findings, but the opposite occurred in Eastern Europe, except French (16).

In this study, the highest incidence of cancer was seen in the Northern provinces and the north-west, and the lowest incidence in the provinces of the south and southeast of the country. The highest and the lowest incidence in the provinces of Semnan and Kohkilooyeh and Boyer Ahmad, respectively, were observed in men and women.

According to the estimations of the International Agency for Research on Cancer (IARC) in 2012, the incidence was 134.7 and 120.1 in Iran in men and women, respectively (17). The incidence was 132.6 and 133 in Pakistan in men and women, respectively (18). In Belgium, the cancer incidence in men and women were 400 and 322 per 100,000 people; in Canada, in men and women were 158.2 and 170.8; in Lebanon, in men and women were 141.4 and 126.8; Cancer incidence in Europe was 446 in men and 284 in women, but the incidence was 303 in men and 204 in women per 100,000 people in the world (16) while the incidence was lower in Mediterranean countries (19). Therefore, the incidence of cancer in Iran was lower than some areas in the word. It seems that the cancer incidence estimated in Iran was not real and we underestimate the incidence of cancer in Iran, due to problems such as the low quality of cancer registry system in Iran and the fact that in many cases we do not perform biopsy and therefore the disease goes un-

diagnosed in this case. In contrast to the situation, in certain developed countries in the last decade the incidence and mortality of cancers were decreasing (20, 21). This difference might be due to fast changes in lifestyle, exposure to risk factors, aggregation of carcinogens, air and environmental pollution in Iran that led to increasing trend in cancer incidence (2, 3, 22).

Limitations: There were some limitations in our study. Data in our registry were limited to pathology, residency, sex, and age while other related variables like feeding pattern, job, and other lifestyle and socioeconomic factors have an important role in susceptibility to cancer. Additionally, registration in that period of time was limited to the pathology system so a large number of cancers were missed. It should be stated that the cancer registry system in Iran is still not fully and equally conducted in all areas and sometimes the differences in the quality and coverage of data is observed. In addition, we observed that provinces with the highest incidence rates in males were different from those where the highest rates were those of female cancers but regarding the study design; we cannot determine the cause of the differences.

5.1. Conclusions

In conclusion, although the incidence of cancer has increased in Iran , the incidence of cancer in Western countries is lower. According to changing lifestyles and dietary habits, it is possible that in the coming years we will be faced with a higher incidence of cancer in the country; therefore, the plan for the control and prevention of this disease must be a high priority for health policy makers. Our findings were obtained from the descriptive study on the incidence trend of the disease in recent years and it is recommended that analytical studies be conducted to obtain a causal relationship and solve problems related to the disease.

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Footnotes

Authors' Contribution: Mostafa Enayatrad and Seideh Zeinab Almasi contributed to the study design and data entry. Mostafa Enayatrad and Seideh Zeinab Almasi designed the study, analyzed the data and wrote the paper. Hamid Salehiniya and Neda Amoori contributed to literature review and writing-up process. Mostafa Enayatrad and Sepideh Mahdavi contributed to writing-up and submission process. All authors read and approved the final manuscript.

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