

Gender-Age Disparity of Cancers' Incidence in Iran

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Abstract- Cancer is one of the leading causes of death worldwide and among Iranian population; cancer is the third important causes of death. It is a critical issue to identify sex and age group difference of cancer pattern for planning and management of cancer patients, therefore the aim of present study was to examine sex and age difference in cancer incidence during 2003-2008 in Iran. The National Cancer Registry (NCR) reports from 2003 to 2008 have been applied to test trend of cancer incidence and illustrating sex-age disparity of most common cancers in Iran. Direct adjustment method was used for computing the age-specific rates (ASRs) and Cochran-Armitage tests for trends were used to test statistical significance of cancer incidence rate in both genders during 2003-2008. Our findings indicated that male and female incidence rate is increased from 64.2 to 117.5 and from 50.1 to 105.8, respectively during 2003-2008 (P for trend <0.001). Highest Age-Specific Rate of cancer in male was for stomach cancer (ASR=12.8), beside of skin cancer and in female was for breast cancer (ASR=33.2). Highest incidence rate of cancers was found in people aged 80-84 years in both genders. In elderly people, incidence rate of cancer was higher in male than female. The observed sex-age disparity of common cancers in this study indicated that male cancer of stomach and bladder and female cancer of breast and colorectal can be targeted in cancer control and prevention programs are required to reach remarkable reduction of cancer burden in Iran.

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Introduction

Cancer is one of the leading causes of death worldwide, 8.2 million people are estimated to die from cancer worldwide (1). It is estimated that 14.1 million new cases of cancer occurred worldwide (1). More than half of cancer deaths occurred in low and middle-income countries and lung, liver, stomach, and bowel are the most common causes of cancer death worldwide, accounting for more than 50 percent of global mortality due to cancer as mentioned before (1). Among the Iranian population, cancer is the third important cause of death (2).

Among all cancer types, a number is said to be gender-

related including: breast, cervical and ovarian cancers in the case of women, and prostate and testicular cancers in the case of men (3). In general, gender is known as a permanent and no modifiable risk factor in cancer epidemiology. Genders do not have equal susceptibility to disease and there are incidence rate disparities in both sexes according to the order and type of cancer. The differences likely have been attributed to behavioral, physiological, hormonal, and reproductive differences of factors (3). There are differences between the two sexes in the regulation of gene expression changes that may also be responsible for differential risk between males and females (4). Immune surveillance is a physiologic

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mechanism protecting our bodies from cancer progression. There are also differences in immune surveillance between two sexes that contribute to the gender effect in cancer incidence (5). Changes in cancer incidence rates are largely due to variations in age structure in both sex groups. The age-specific incidence rate for each age class, can be simply calculated as a rate per 100,000 and differ in the cancer site and gender (6).

Sex differences in incidence and mortality rates have been reported and may be related to differences in exposures, routes of entry and the processing of a foreign agent, cellular responses and hormones (7,8). It is a critical issue to identify sex and age group difference of cancer pattern for planning and management of cancer patients while, the determination of trends is important to develop a causal hypothesis or high-risk subgroup for development of cancer screening guideline (9). The disparity in incidence and mortality of cancers according to HDI were shown in previous studies (10-15). In this study, we aimed to describe the pattern of common cancer incidences based on sex difference in Iran, using the national data through 2003 to 2008. We also estimated the incidence rate of 10 common cancers by age-specific incidence rate for all cancer sites in 2008. This paper is the first report which clarifies the pattern of common cancer by sex in Iran, according to the national data.

Materials and Methods

The present study used re-analysis of cancer registry records from national registry of cancer (NCR) during 2003-2008. Method for NCR in Iran in summary is as follows; using the national registration software which was developed by CDC in health deputy of 41 Medical Universities in Iran the cancer records were collected and included in the NCR. For pathology labs, the cancer

records were collected manually. Collected data in Cancer Office of health ministry transmitted every three months in electronic file and also hard copy of Cancer Registry Data Collection Form. Data was categorized into three classes; a) patient's identity characteristics including age, sex, province and residency location, b) important findings of patient's clinical history and c) preclinical findings. The number of cases for each province was separately prepared after using the robust methods for removing duplicated records and capture-recapture methods for completeness of cancer registry reports. Detail on registering cancer records in Iran is published elsewhere (16). Using world population as standard one, direct adjustment method was used for computing the age-specific rates (ASRs) (17). Data presented by using MS Excel 2010. Cochran-Armitage tests for trends were used to test statistical significance of cancer incidence rate in both genders during 2003-2008.

Results

The incidence rate for cancers by gender is shown in table 1. Male and female incidence rate was increased from 64.2 to 117.5 and from 50.1 to 105.8, respectively during 2003-2008 (P for trend <0.001). In 2008, the most common cancer among Iranian male was stomach cancer (12.8% with ASR of 19.1) beside skin cancer and among female was breast cancer (24.9% with ASR of 33.2) (Figure 1 and Table 2). Figure 2 shows the incidence rate of cancer by age group separately in male and female.

In elderly people, (over 50 years) incidence rate of cancer was higher in male than female. Looking at the population pyramid in Iran, male and female highest incidence rate of cancer was 2345 per 100, 000 for male people aged 80-84 (and 1262 per 100, 000 for female.

Table 1. Changes in the trend of incidence rate per 100,000 for all cancers in Iran by sex (2003-2008)

Variable	2003	2004	2005	2006	2007	2008	P. Trend
Males	64.2	78.7	90.4	95.8	97.4	117.5	<0.001
Females	50.1	60.2	80.5	84.8	87.2	105.8	<0.001
Total	57.2	69.4	70.6	73.8	77.1	94.1	<0.001
Sex Ratio	1.28	1.3	1.27	1.3	1.26	1.25	-

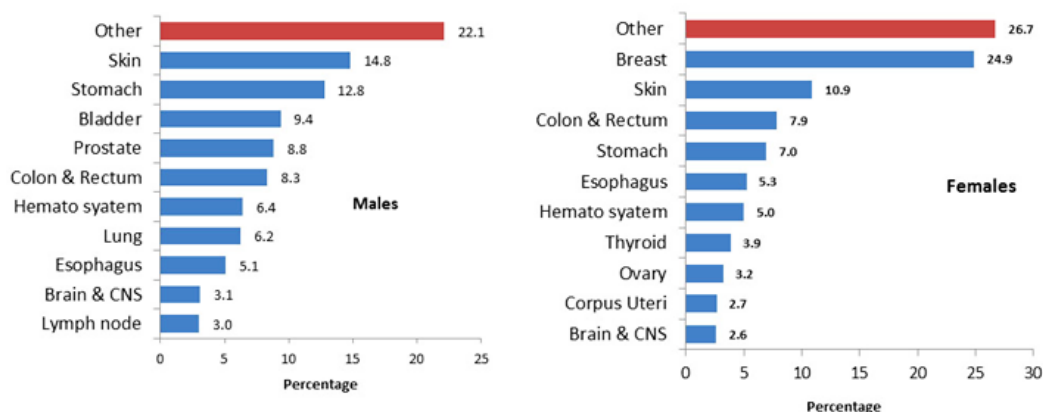


Figure 1. Percentage of 10 common cancers in Iran in term of gender, 2008

Table 2. Incidence rate per 100,000 for 10 common cancers by sex, in Iran (2008)

Cancer Type	Males				Females			
	Frequency	CR	ASR	% of all cancers	Frequency	CR	ASR	% of all cancers
Skin	6268	17.4	22.6	14.8	3696	10.8	15.8	10.9
Breast	192	0.5	0.7	0.4	8424	24.7	33.2	24.9
Stomach	5398	15	19.1	12.8	2353	6.9	10	7
Colorectal	3527	9.8	12.7	8.3	2658	7.8	11.1	7.8
Bladder	3957	11	14.4	9.4	883	2.6	3.8	2.6
Hematopoietic system	2700	7.5	8.9	6.4	1693	5	6.3	5
Esophagus	2140	5.9	7.7	5.1	1782	5.2	7.8	5.3
Prostate	3733	10.4	12.8	8.8	-	-	-	-
Lung	2211	6.1	8	5.2	839	2.5	3.6	2.5
Brain and CNS	1300	3.6	4.2	3.1	894	2.6	3.1	2.6

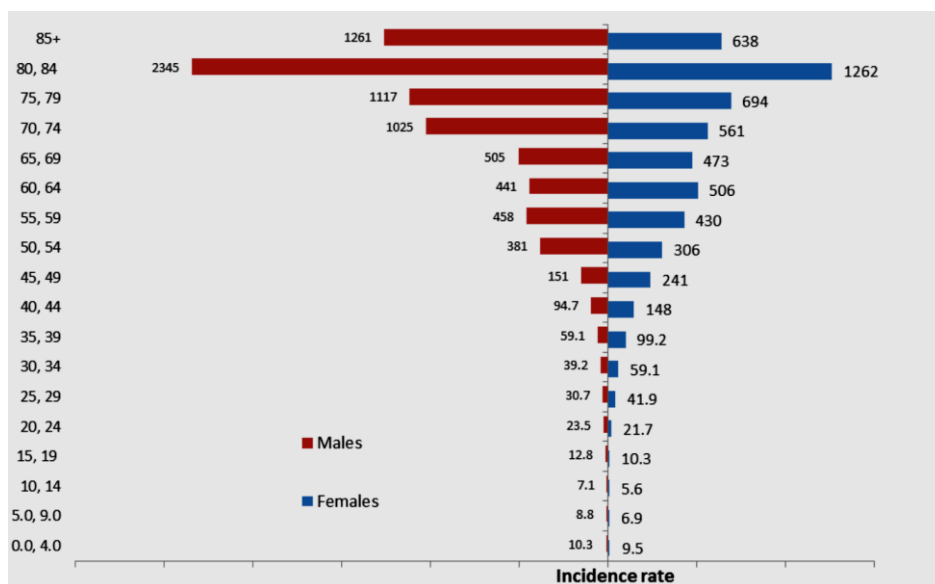


Figure 2. Age-specific incidence rate per 100,000 for all cancer sites by sex, in Iran (2008)

Discussion

Monitoring cancer trends are one of the most

important functions of a cancer surveillance system (18). This report presents trends in common cancer incidence (new cases) rates by two sexes. Annual percent change in

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cancer rates was calculated for the period between 2003 through 2008. Review on Iran national data shows a significant increase in cancer incidence rates annually. This pattern is in consistency with the global trends of cancer incidences (17). These incidence rates will rise in the next decades if exposure to cancer risk factor remains unchanged. This increase may be attributed to increment use of tobacco and alcohol, and obesity and other unhealthy practices as well as development in diagnosis and screening techniques (19). In our analysis, male to female ratio was more than 1, that is related to higher incidence rates in men and only in breast cancer is a woman is a risk factor and the ratio of male to female was less than one.

Leading sites of globally new cancer estimates in 2008 were 16.5% lung and bronchus, 13.8% prostate and 10% colon and rectum in men (17), in comparison with leading sites of morbidity in Iranian men were including 14.8% skin, 12.8% stomach and 8.8% bladder. In the whole world, prostate cancer was the second most frequently diagnosed cancer in men while it was in the fourth rank in Iranian men. Colorectal cancer was the second most common cancer in women worldwide and the third in Iranian women. An estimated 215,020 new cases of Lung and Bronchus cancer occurred worldwide in 2008, accounting for about 8.5% of new cases for female cancer and 16.5% of male new diagnosed cases while was not in the top ten most common causes of cancer in Iran (17). Breast cancer was the first leading site of cancer in women worldwide (22.9% of new cases) as well in Iran (24.9%). Estimated numbers of urinary bladder cancer occurred in 2008, makes it the ninth most important cause of cancer in men worldwide. The highest incidence rates were found in Europe, northern Africa and the Middle East. It was the third cause of cancer incidence in Iranian men. Smoking is the most important risk factor for bladder cancer that is more prevalent in men, so bladder cancer occurrence is more prevalent in men than women (20).

In developed countries, 78% of all new cancer cases occur at age 55 and older compared to 58% in developing countries such as Iran about 86% of cancers occur after ages of 55. The difference is largely due to variations in the age structure of the populations. The age-specific rates were relatively low in populations younger than 55 years for both males and females. Eighty nine percent of cases in males and 82.7% in females occurred in those aged ≥ 55 ; similar proportions in each sex were diagnosed aged 55-64 (males: 11%; females: 17%) and < 55 (males: 10%; females: 17%) (21).

The difference in the age distribution of cancers in

Iran and the world, especially developed countries could be due to different genetic and environmental factors and different lifestyle. It can also be due to the lack of regular and periodic screening programs. For example the most important risk factors for gastric cancer in Iran including a high prevalence of *H.pylori* infection, high dietary intake of salt and smoking are the main environmental factors of gastric cancer in Iran which are more common as compared with developed countries (22). The studies carried out in this field showed that smoking in Iranian men is common and at least 30% of men aged 25 years and over are smokers. For other cancers, the differences in the distribution of genetic and environmental factors and lifestyle are responsible for the difference in the age distribution of cancers in Iran compared with other developed countries (23,24).

The risk of cancer incidence increases substantially with age. We used the age adjustment method to compare groups of people in different age groups. Without adjusting for age, it would be inaccurate to compare the cancer rates of Iran to estimates of other countries. This report shows the estimated age-standardized incidence rates (per 100,000) for various types of cancers by sex in 2008. All cancers in the world excluding non-melanoma skin cancer, ASRs of incidence are 204.4 in men and 164.9 in women. The global estimate of age-specific rate for female breast cancer is 39 and in Iran are 33.2. Age is the most important factor affecting breast cancer risk in the female. The primary factors that contribute to the striking incidence variation in different ages include differences in reproductive and hormonal factors. Estimated ASR in Iran is in consistent with worldwide estimates (19.8 in men and 9.1 in women). The overall sex ratio of the ASRs for colorectal cancer is 1.4:1. The highest incidence rates occur in Australia/New Zealand and Western Europe, the lowest in Africa and South-Central Asia. Incidence rates are substantially higher in men than in women. The ratio is 12.7:11.1 in Iran and 20.4:14.6 worldwide. Age-specific rates in Iran and the US are similar in younger 40-year-old Iranians and Americans, but much lower rates in older Iranians (25).

Despite the data quality and the methods of estimation was the best available evidence and may be used, it should be emphasized that the estimates presented are limited in accuracy, depending on the incompleteness of registry reports in Iran.

The observed sex-age disparity of common cancers in this study indicate that male cancer of stomach and bladder and female cancer of breast and colorectal can be targeted in cancer control and prevention programs to are required to reach a remarkable reduction of cancer burden

in Iran.

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