RESEARCH ARTICLE

Difference in the Incidences of the Most Prevalent Urologic Cancers from 2003 to 2009 in Iran

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Abstract

Background: Urological cancers represent a major public problem associated with high mortality and morbidity. The pattern of these cancers varies markedly according to era, region and ethnic groups, but increasing incidence trends overall makes focused epidemiological studies important. The aim of the present study was to assess the incidence of most prevalent urological cancers in Iran from 2003 to 2009. Materials and Methods: The data for this study were obtained from the population-based Cancer Registry Center of the Iran Ministry of Health and Medical Education. Differences of mean age and age distributions of each cancer were compared between 2003 and 2009 in men and women. Results: Bladder cancer was the most common urologic cancer in both genders. The rate difference of age standardized ratio (ASR) of bladder and renal cell carcinoma in women were 1.54 and 2.01 percent per 100,000 population from 2003 to the 2009, respectively. In men, the rate difference of age standardized ratio of prostate, testis, kidney and bladder cancer was also 2.23, 1.2, 1.8 and 1.5 percent per 100,000 population from 2003 to 2009, respectively. The mean ages of patients in all cancers in both genders did not differ significantly through time (p value>0.05) but the distribution of ages of patients with bladder and prostate cancer changed significantly from 2003 to 2009 (p value<0.001). Conclusions: The results of present study suggest the general pattern and incidence of urological cancers in Iran are changing, the observed increase pointing to a need for urological cancer screening programs.

Keywords: Urologic cancer - epidemiology - change over time - gender specificity - Iran

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Introduction

Urological cancers represent a major public problem which can lead to high mortality and morbidity but the true burden of these cancers is unknown due to the lack of comprehensive epidemiological studies (Parker et al., 1997). This makes epidemiological research important in lights of its preventability through early diagnosis and limiting exposure to risk factors.

The pattern of these cancers varies markedly according to era, region and ethnic groups. The incidence of urological cancers is higher in western countries than in other countries (Parker et al., 1997). Designing the structural epidemiologic study is necessary due to lack of information regarding the incidence and increasing rate of these cancers in Iran. Besides, improvement of knowledge toward the burden of suffering and mortality from these cancers can help to assess the diagnostic measures and indicate the need for continued promotion of urological cancer screening program (Cheon et al., 2002; Jemal et al., 2006).

Epidemiological studies have consistently shown that there is a lower incidence of urological cancers among Asian people compared to western one. In USA, estimation shows that 140,430 new cases of urological cancer have been diagnosed in 2013 and 29,790 patients will die from these cancers (Siegel et al., 2013). While increasing overall urological cancer diagnosis rates have been reported, such rates may obscure important trends in specific age groups (Bedwani et al., 1993; Cheon et al., 2002). Identifying these age specific difference is important for clinical suspicion to evaluate patients and assess possible exposure that may influence the cancer incidence. Furthermore, the incidence and death-related of urological cancers have been rising in recent years due to the increasing risk factors. (Morrison et al., 1984)

Since the incidence of urological cancers in Iranian population has not been studied before, the present paper compares the difference of the incidence of urological cancers in Iran from 2003 to 2009. This study may assist prevention and early detection and help for a better understanding of cancer epidemiology in Iran.

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Materials and Methods

All patients diagnosed with prevalent urological cancers according to the International Classification of Diseases for Oncology (ICD-O) (prostate=C61, testis=C62, kidney=C64, bladder=C67) (AG, 2000) identified from the population-based cancer registry held by Iran Ministry of Health guideline (Education, 2006). This registry contains information on cases diagnosed from 2003-2009 consist of reports from all hospitals and pathology labs which were obtained with the assistance of staff of Urology and Nephrology Research Center and sent for analysis to the Disease Management Center in the Iran Ministry of Health and Medical Education.

The following data were collected: patients' characteristics (age at diagnosis, gender), province and postal code of residence at diagnosis as well as tumor's characteristics such as date of diagnosis, histology (morphology), and site of origin (topography).

Ten percent of the data were rechecked every year by cancer register office professionals to check the sensitivity of data gathering.

Yearly incidence of urological cancers were calculated by number of cases diagnosed in each specific age group in specific period of time divided by sum of that specific age group of that year population provided by the National Statistical Office, Iran, then multiplied by standard WHO population for that age group. Adding the number of all age groups results the Age Standardized Ratio of the disease in the targeted population which expressed per 100,000. The difference of mean age and age distributions of each cancer was compared between 2003 and 2009 in different gender using two samples T - test and Pearson chi-square evaluation, respectively. In statistical analysis, the patients aged lower than 20 were excluded, due to the low number of cases. Statistical analysis was done with STATA, version 10.0 and $p<0.05$ considered statistically significant.

Results

Incidence of urological cancer and ASR

The incidence and Age Standardized Rate (ASR) of the most prevalent urological cancers in 2003 are as follows: bladder cancer 482 (2.12) and renal cell carcinoma 228 (0.96) in women; bladder cancer 2263 (8.35), renal cell carcinoma 367 (1.39), testicular cancer 359 (1.05) and prostate cancer 1548 (5.4) in men. In 2009, these figures are reported as: bladder cancer 837 (3.28), renal cell carcinoma 488 (1.93) in women, bladder cancer 3764 (12.59), testicular cancer 564 (1.3) and prostate cancer 3856 (12.5) and renal cell carcinoma 776 (2.65) in men (Table 1).

According to the reported ASR, the rate difference of bladder and kidney cancer in women were1.54% and 2.01% per 100,000 populations from 2003 to the 2009, respectively. In men, the rate difference of prostate, testis, kidney and bladder cancer were 2.23%, 1.2%,1.8% and 1.5% per 100,000 population from 2003 to 2009, respectively.

Bladder cancer

The mean age at diagnosis for women with bladder cancer was 64.9±13.05 and 64.57±15.44 in 2003 and 2009, respectively, which didn't show significant change over time (p value>0.05). This was also neither statistically significant in men (Table 2).

The majority of patients with bladder cancer in either sex were over age 50 in 2003 and 2009 (85.9% of women and 82.96% of men in 2003 and 83.74% of women and 86.1% of men in 2009). The Incidence rate of bladder cancer for age under 49 was relatively rare in both years, but then took an upward slope and peaked at 60+ and 70+ in 2003 and 2009 respectively. The distribution of patient's age differed significantly in 2003 and 2009 in both sexes (Table 3) (p value<0.001).

Prostate cancer

The mean age of patients with prostate cancer in 2003 did not differ significantly in comparison to that of 2009 which is demonstrated in Table 2 (p value>0.05). However, the age distribution of patients with prostate cancer has significantly changed during study time (p value<0.001). The majority of patients was aged over 60 (89.47%) in 2003 and (84.9%) in 2009. The peak of age of prostate cancer patient in both years remained at 70+

Table 1. The Incidence Rate and Age Standardized Ratio (ASR) of Urological Cancer in Males and Females in 2003 and 2009

Urological cancer	2003				2009			
	No. of patients (crude rate)	ASR	No. of patients (crude rate)	ASR	No. of patients (crude rate)	ASR	No. of patients (crude rate)	ASR
	Male		Female		Male		Female	
Kidney cancer	367(1.08)	1.39	228(0.70)	0.96	776(1.97)	2.65	488(1.42)	1.93
Bladder cancer	2263(6.63)	8.35	482(1.49)	2.12	3764(9.57)	12.59	837(2.44)	3.28
Prostate cancer	1548(4.54)	5.4	0(0)		3856(9.80)	12.59	0(0)	
Testicular cancer	359(1.05)	1.05	0(0)		564(1.43)	1.3	0(0)	

Table 2. The Difference of Mean Age in 2003 and 2009 in Males and Females in Urologic Cancer

Year	Bladder cancer	Prostate cancer		Renal cell carcinoma		Testicular cancer
	Male	Female	Male	Male	Female	Male
2003	64.22±13.40	64.96±13.05	71.36±09.30	54.25±19.68	49.75±17.77	33.35±15.26
2009	64.77±13.99	64.57±15.44	70.96±10.83	54.55±18.59	50.95±20.04	34.33±15.39

*p value>0.05 in all urologic cancers

Table 3. The Age Distribution of Bladder Cancer in Males and Females in 2003 and 2009

Age	2003		2009	
	Male (%)	Female (%)	Male (%)	Female (%)
20-30	32 (1.41)	12 (2.56)	92 (1.17)	55 (3.18)
30-40	100 (4.42)	13 (2.78)	244 (3.11)	69 (3.99)
40-50	254 (11.21)	41 (8.76)	755 (9.62)	157 (9.09)
50-60	402 (17.75)	78 (16.67)	1,666 (21.23)	340 (19.68)
60-70	670 (29.58)	144 (30.77)	1,989 (25.35)	379 (21.93)
70-80	626 (27.64)	140 (29.91)	2,190 (27.91)	491 (28.41)
80+	181 (7.99)	40 (8.55)	910 (11.60)	237 (13.72)

*p value in female=0.001; p value in male<0.001

Table 4. The Age Distribution of Prostate and Testicular Cancer in Males in 2003 and 2009

Age	Prostate cancer		Testicular cancer	
	2003(%)	2009(%)	2003(%)	2009(%)
20-30	0 (0)	16 (0.21)	108 (36.24)	403 (40.54)
30-40	3 (0.19)	19 (0.25)	104 (34.90)	293 (29.48)
40-50	25 (1.62)	130 (1.74)	48 (16.11)	145 (14.59)
50-60	134 (8.71)	962 (12.89)	14 (4.70)	71 (7.14)
60-70	489 (31.77)	2,041 (27.36)	14 (4.70)	45 (4.53)
70-80	681 (44.25)	3,055 (40.95)	8 (2.68)	26 (2.62)
80+	207 (13.45)	1,238 (16.59)	2 (0.67)	11 (1.11)

*p value in female=0.001; p value in male<0.001

Table 5. The Age Distribution of Renal Cell Carcinoma in Males and Females in 2003 and 2009

Age	2003		2009	
	Male (%)	Female (%)	Male (%)	Female (%)
20-30	6 (1.97)	7 (4.00)	29 (2.06)	32 (3.79)
30-40	12 (3.93)	27 (15.43)	102 (7.24)	79 (9.35)
40-50	67 (21.97)	41 (23.43)	262 (18.61)	178 (21.07)
50-60	71 (23.28)	47 (26.86)	400 (28.41)	252 (29.82)
60-70	87 (28.52)	35 (20.00)	337 (23.93)	160 (18.93)
70-80	54 (17.70)	16 (9.14)	223 (15.84)	120 (14.20)

(Table 4).

Renal cell carcinoma

The difference between the mean age of patients with renal cell carcinoma which is shown in Table 6 in 2003 and 2009 in both sexes was not statistically significant (Table 2) (p value>0.05). The majority of women were aged between 30 to 70 in 2003 (87.72%) and between 40 to 70 years old in 2009 (84.02%). In men, 91.47% and 86.79% of patients were aged between 40 to 70 years old in 2003 and 2009, respectively. The peak of age has not changed over time and remained at 50+ in women but in men it has shifted from 60+ in 2003 to 50+ in 2009 (Table 5). The difference of age distribution in both sexes through time was not statistically significant (p value>0.05).

Testicular cancer

The difference between the mean age of patients with testicular cancer in 2003 and 2009 was not statistically significant (p value>0.05) (Table 2). The age distribution of patients who suffered from testicular cancer was not changed significantly through time from 2003 to 2009 (p value>0.05). Most patients fell into the 20-30 age group in 2003 which was as same as the age distribution of patients with testicular cancer in 2009 (Table 4).

Discussion

The epidemiological pattern of cancers incidence in developing countries differ in many aspects from that of industrialized nations (Basile et al., 2006). Therefore, it is essential to understand the epidemiological feature of these cancers. The surveillance of urological cancer incidence and mortality trends provide us with clues to etiology and evaluation the effects of improved diagnostic, screening techniques.

Although the incidence of bladder cancer in Asia is lower in comparison to western countries, it is one of the most common urological cancer in Iran (Akbari et al., 2008).The American Cancer Society estimated 72,570 new cases of bladder cancer will be diagnosed in 2013 in both sexes and an estimated 15,210 patients will die of this disease (Siegel et al., 2013). Bladder cancer is the disease of elderly and the peak of patient's age has shifted from 60+ to 70+ during the present study. This could be the effect of improved quality of life and subsequent lifetime span. Our findings are consistent with the report of Yavari et al. who found that 88% of patients were over 50 years at diagnosis (Yavari et al., 2009).

We also found that the rate difference of Age Standardized Rate of bladder cancer was 1.5% per 100,000 in both sexes between 2003 to 2009 which was also noted by Moore et al. (2010), who reported the increased rates of bladder cancer in North-Western and Central Asian with highest rate of increase in Kazakhstan and Iran (Moore et al., 2010). However, some of this increase could be attributed to the increased rate of pathological centers which cooperate with Cancer Registry Center in recent years.

The male to female ratio of this cancer varies in different part of the world. It was less than 3 in Indian, Thailand and US black population but is more than 6 in several parts of Southern Europe such as Spain, Where the prevalence of cigarette smoking is higher in men than women (Parkin et al., 2005). Many risk factors have been attributed to the development of bladder cancer in Iran (Shakhssalim et al., 2010) including cigarette smoking, opium consumption, history of excessive analgesic use and hair dye usage which result in changes in the genome of transitional cells that line the urinary tract and cause carcinogenesis. Recent Meta-Analysis resulted that Obesity and Diabetes Mellitus is also associated with increased risk of bladder cancer (Qin et al., 2013; Yang et al., 2013) and it seems that we will have to confront a higher incidence of bladder cancer in the future with current increasing rate of cigarette smoking and obesity.

Prostate cancer remains the leading urologic cancer of adult men in United States (Karim-Kos et al., 2008). The American cancer society estimates that 238,590 new cases of prostate cancer will be diagnosed in USA in 2013 and 29,720 men will die from this disease (Siegel et al., 2013). Although the trend in the incidence of prostate cancer have been increased in USA, Canada and European countries in recent years (Chu et al., 2003; McDavid et al., 2004; Gondos et al., 2009) but the death related report of this cancer decreased due to the advancement in the management of this neoplasm (Levi et al., 2004; Duncan

and Goldacre, 2011). The introduction of widespread testing for serum prostate-specific antigen (PSA) has increased the proportion of anticipated diagnosis which in turn increased the incidence of this cancer (Bray et al., 2010). In our survey, the incidence rate of the prostate cancer has increased from 4.54 in 2003 to 9.8 in 2009. This could be attributed to variety of risk factors including environment, diet and also improved diagnostic techniques. Socio-economic status and westernized diet especially high fat intake is considered to play an important role in the increasing incidence of prostate cancer in Iran (Rohani-Rasaf et al., 2013). Shahar et al. (2011), in a comprehensive study in Malaysia concluded that low fat diet, high intake of fruits, vegetables and being physical active are protective factors in prostate cancer (Shahar et al., 2011). Other meta-analysis resulted that diabetes is also associated with increased risk of prostate cancer in Asians (Long et al., 2012). On the other hand, improvement of diagnostic techniques in recent years including PSA and systemic biopsies can detect cancer in the early stages for those who would have been remained unknown in the past.

The incidence of renal cell carcinoma has increased in both sexes in United States between 1975-2006 (Edwards et al., 2010) the estimation for renal cell carcinoma in 2013, shows that 65,150 new cases will be identified in both gender and 13,680 patients will die (Siegel et al., 2013). In this study the rate difference of renal cell carcinoma were 2.01 and 1.8 percent per 100,000 in women and men respectively. The peak of age at diagnosis shifted from 60 in 2003 to 50 in 2009 for men. Early detection of renal cell carcinoma following more frequent use of ultrasonography, computed tomography (CT) and other screening techniques seems to be the cause of this dissimilarity in recent years (Cohen and McGovern, 2005). One of the important risk factors for RCC is being overweight (Brennan et al., 2008) and increased prevalence of overweight and obesity in last decade among men and women may be responsible at least in part for the rising incidence rates of RCC (Ildaphonse et al., 2009; Mathew et al., 2009) which was also seen in several European countries (Gallus et al., 2006).

Testicular cancer is the most common type of malignancy in men aged 15-40 years (Dieckmann and Pichlmeier, 2004). The incidence of testicular cancer has been increasing in most populations (Purdue et al., 2005; Bray et al., 2006; Karim-Kos et al., 2008) and the reasons of this rise are not entirely clear (McGlynn and Cook, 2009). On the other hand, the incidence of this cancer is rare among black US and Asians and African population (Purdue et al., 2005) the American cancer society estimated 7,920 new cases of testicular cancer will be diagnosed in 2013 and 370 patients die from it (Siegel et al., 2013). Testicular cancer had the lowest increase among all cancers and the rate difference of this cancer was 1.2% per 100,000 population from 2003 to 2009. In contrast to incidence, as a consequence of improved treatment, survival from this cancer has increased in European countries (Karim-Kos et al., 2008; Gondoset al., 2009). The increased incidence of testicular cancer may, in part, be related to the different risk factors including elevated socioeconomic status in most countries, increased maternal age and low parity, estrogenic or anti androgenic effects (endocrine modulators) which interfere with gonadal development (Panagiotopoulou et al., 1990; Moller and Skakkebaek, 1996; 1997; Safe, 2002; McGlynn et al., 2003).

Although the incidence of all urological cancers increased through time, we should not deny the fact that some of its increase is accounted for the more precise data gathering in Cancer Registry Center in recent years. The cooperation of pathological centers for reporting the results of cancers has been increased through time and this can be the limitation of current study.

In conclusion, the results of this study suggest the general pattern and changes of incidence of urological cancers and indicate the need for promoting urological cancer screening programs. Based on above results, the present study summarizes the increased pattern of incidence rate of urological cancer in Iran and can envisage the path to the future research.

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