Original Research

Mortality rates due to Bladder cancer in Iran during 2001-2007: A national cancer registry-based study

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Abstract: **Introduction:** Bladder cancer is the ninth common cause of cancers in both sexes worldwide. Nevertheless, little is known about the descriptive and analytic epidemiology of bladder cancer in Iran. The present study aimed to describe the nationwide distribution of death due to bladder cancer in Iran.

Methods: This cross-sectional study used data of bladder cancer cases who were registered in the national cancer-registry system by the Ministry of Health and Medical Education during 2001-2007. Age-standardized mortality rates due to bladder cancer were presented according to nine geographic poles across the country.

Results: The overall mortality rate of bladder cancer (per 100,000 population) was 2.26 in men and 1.36 in women; while the rates were constantly higher for men across all age groups. The highest and lowest age-standardized mortality rates in provinces (per 100,000 population) belonged to Mazandaran (6.126) and Tehran (1.112), respectively.

Conclusion: Death from bladder cancer seems to increase by age in Iran, mainly among men. This association might be partially due to increased life expectancy, altered high-risk lifestyle behaviors and/or improvement in cancer registration system. Information on the distribution of mortality due to bladder cancer could be useful for local prevention strategies, where specific profile of communities and patients is taken into account.

Keyword: Urinary Bladder Neoplasms, Mortality, Registry

1. Introduction

Cancer is one of the major health problems and a major cause of the burden of disease worldwide (1). In general, cancers are ranked the third cause of death following accidents and cardiovascular diseases in Iran (2,3). Similar to many cancers, bladder cancer incidence is also influenced by changing in the distribution of certain risk factors such as tobacco smoking, and by dramatic improvement in data registration and cancer diagnosis. With 430,000 new cases and 165,000 deaths worldwide in 2012, bladder cancer is the ninth common cause of cancers in both sexes (2). Most cases (77%) happen in men. The global mortality rate is 4 per

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100,000 in men and 1.1 per 100,000 in women (4). According to epidemiologic studies bladder cancer incidence is increasing in Iran (3, 4).The variation in incidence and mortality of bladder cancer in different countries is due to various environmental risk factors and genetic differences. The highest incidence of bladder cancer has been reported in Egypt, Europe, North America and North Africa (5-7); while the lowest incidence has been reported in Asian countries (7). Bladder cancer is known as the cancer of developed countries, where the age-standardized incidence is 3- 4 times higher in comparison to developing countries (8-10). Cigarette and opium smoking and occupational exposures are the well-established risk factors for development of bladder cancer (11).

Due to limited evidence on morbidity and mortality of bladder cancer in Iran, the present study was conducted to estimate the mortality pattern of bladder cancer using data of the national cancer-registry system in Iran during 2001-2007.

2. Method

Data of patients in this study was collected from the Department of National registry on Cancer located at the Ministry of Health and Medical Education (MOH&ME) in Iran during 2001-2007. In this study, all patients who were diagnosed with primary bladder cancer and registered in MOH&ME were included. The following information was collected via a telephone survey by trained interviewers after informed consent was sought verbally: survival status, demographic characteristics, age of diagnosis, pathological findings, and clinical profile. Verbal autopsy was performed for deceased patients on one first-degree family member. According to the study protocol, three teleph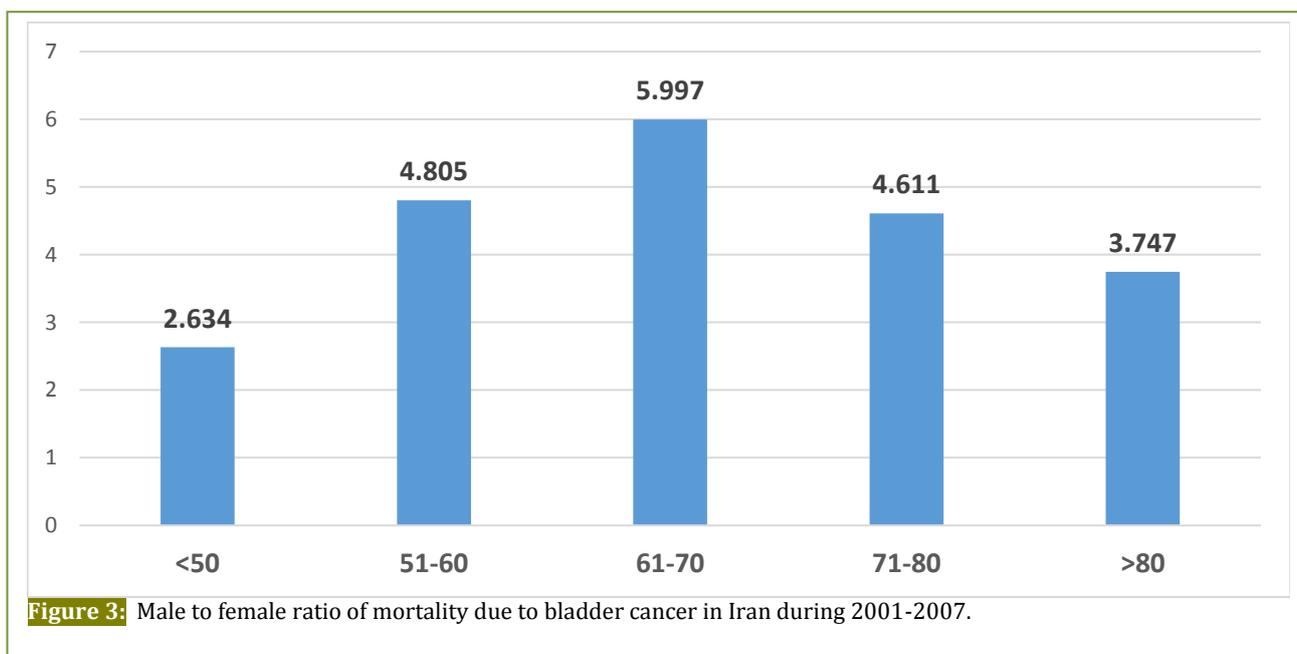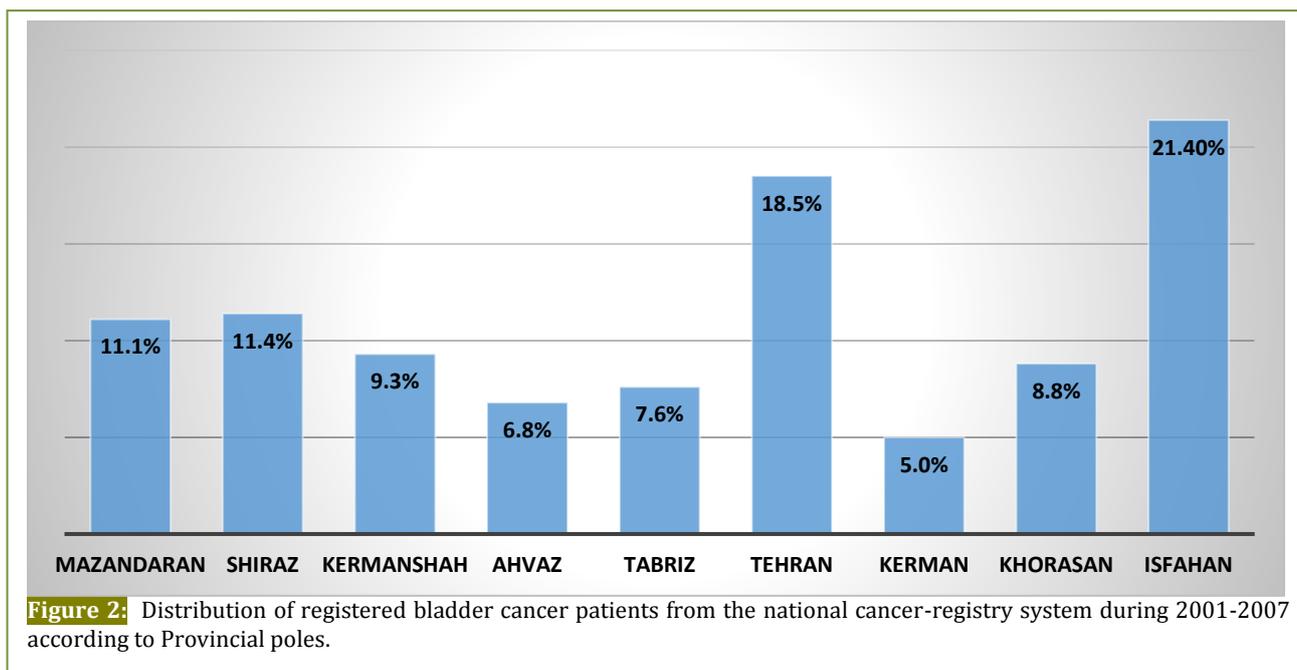one calls within two consecutive weeks were considered as sufficient attempt to collect the information. We excluded cases whom we call them three times within two consecutive weeks and received no response. For statistical analysis, age of diagnosis was categorized into five groups: less than 50, 51-60, 61-70 and 71-80, and over 80 years. The pathologic type of bladder cancer was dichotomized. Provincial poles were categorized based on Universities of Medical Sciences into nine categories including: Mazandaran (Universities of Mazandaran, Gilan, Golestan, Semnan, Babol), Shiraz (Universities of Shiraz, Bushehr, Bandar Abbas, Kohgeloyeh, Jahrom, Fesa), Kermanshah (Universities of Kermanshah, Kordestan, Hamadan, Ilam), Ahvaz (Universities of Ahvaz, Lorestan), Tabriz (Universities of Tabriz, West-Azarbayejan, Ardabil, Zanjan), Tehran (Universities of Tehran, Markazi, Gahzvin, Ghom), Kerman (Universities of Kerman, Zahedan, Zabol, Rafsanjan), Khorasan (Universities of Khorasan-Razavi, Khorasan-South, Khorasan-North, Sabzevar, Shahroud, Gonabad), and Isfahan (Universities of Isfahan, Yazd, Chaharmahal, Kashan). Mortality rates with 95% Confidence Intervals (CI) were calculated according to year of registration, gender, age group, and provincial pole by inserting census results as the denominator. Direct standardization was performed to estimate age-standardized mortality rates across nine provincial poles. P-value less than 5% was considered statistically significant. All the analyses were done using STATA version 14 (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP).

3. Result

16,702 patients with bladder cancer were registered, of whom contact information of 7,686 (46%) cases were registered. Of these, 3,946 cases (51%) were contacted
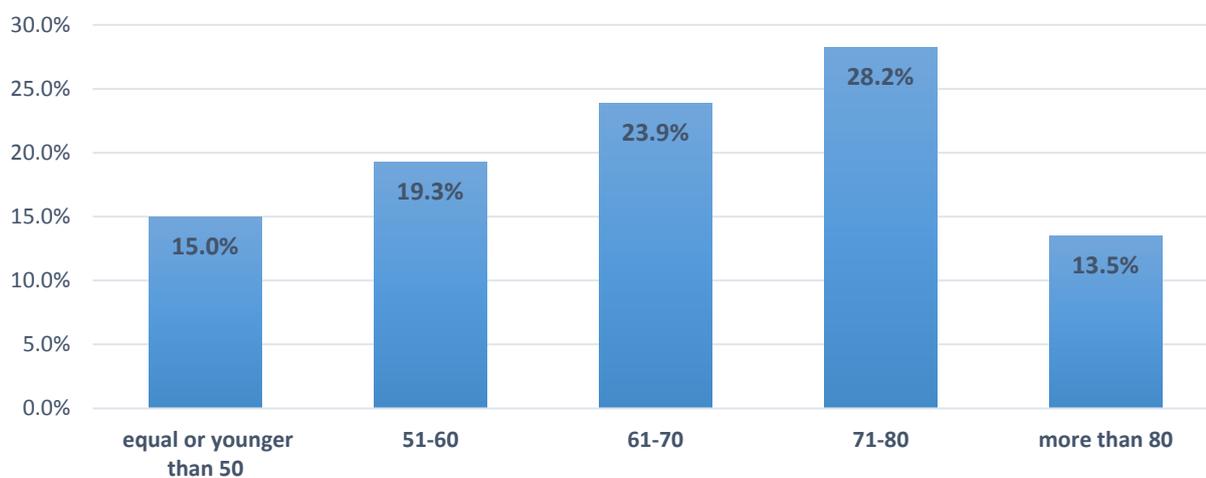
Figure 1: Age at diagnosis among registered patients with bladder cancer from the national cancer-registry system during 2001-2007.

Figure 2: Distribution of registered bladder cancer patients from the national cancer-registry system during 2001-2007 according to Provincial poles.

Figure 3: Male to female ratio of mortality due to bladder cancer in Iran during 2001-2007.

by the telephone survey, and amongst whom information of 3,337 patients (84.5%) was collected. 554 of 3337 patients (16.6%) were female and 2783 (83.4%) were male (Table 1). Distribution of age at diagnosis showed that by the time of diagnosis, the highest and lowest proportion of bladder cancer patients were 71-80 (28.2%) and more than 80 (13.5%) years old, respectively (Figure 1). Moreover, the highest and lowest proportion of bladder cancer cases were registered in Isfahan (21.4%) and Kerman (5%) poles, respectively (Figure 2).

The pathology of bladder cancer was TCC-Low Grade in 2,331 (69.9%) patients, TCC-High Grade in 879 (26.4%) patients, Papillary Adenocarcinoma in 33 (1%) patients,

undifferentiated carcinoma in 18 (0.5%) patients, SCC in 48 (1.4%) patients, and other tumors in 28 (0.8%) patients.

Overall, the mortality rate of bladder cancer (per 100,000 male population) was estimated as 2.26 in men and 1.36 in women. Specifically, the overall mortality rates of bladder cancer in males (per 100,000 male population) according to the provincial poles were as follow: 3.49 in Mazandaran, 2.78 in Shiraz, 2.16 in Kermanshah, 2.05 in Ahvaz, 1.50 in Tabriz, 1.80 in Tehran, 1.32 in Kerman, 2.13 in Khorasan, and 4.33 in Isfahan. Moreover, the mortality rates of bladder cancer in females (per 100,000 female population) according to provincial poles were as follow: 0.83 in Mazandaran,

Table 1: Crude mortality rates due to bladder cancer according to provincial poles (2001-2007)

	Mortality rate (per 100,000 population)				
	<50	51-60	61-70	71-80	>80
Mazandaran					
Male	0. 94 (0. 19, 2.77)	3.91 (1.95, 7.00)	14.58 (9.34, 21.70)	17.55 (13.03,23.13)	52.45 (32.04,80.99)
Female	0.009 (0.002,0.027)	1.03 (0.212,3.00)	1.79 (0.37,5.24)	2.33 (.93,4.81)	13.23 (4.30,30.88)
Shiraz					
Male	0.135 (0.036, 0.346)	5.35 (2.67,9.58)	15.75 (9.00,25.57)	54.68 (40.32,72.49)	65.94 (39.71,102.96)
Female	zero occurrence	zero occurrence	4.94 (1.60,11.52)	12.50 (5.72,23.72)	10.49 (2.16,30.64)
Kermanshah					
Male	0.146 (0.030,0.428)	3.20 (1.04,7.46)	17.87 (10.22,29.02)	39.57 (26.08,57.57)	44.54 (23.01, 77.78)
Female	0.099 (0.012,0.360)	0.617 (0.015, 3.44)	zero occurrence	11.95 (4.80,24.62)	18.17 (4.95,46.52)
Ahvaz					
Male	0.146 (0.03,0.425)	2.19 (0.451, 6.40)	15.39 (7.68,27.54)	50.94 (33.57,74.11)	121.68 (74.34,187.86)
Female	0.101 (0.012,0.364)	0.71 (0.01, 4.00)	4.32 (0.89,12.62)	18.72 (8.08,36.89)	6.41 (0.162,35.70)
Tabriz					
Male	0.111 (0.030,0.285)	4.55 (2.35, 7.95)	1.66 (6.32,16.85)	14.97 (9.01,23.37)	31.00 (16.5,53.01)
Female	0.028 (0.000,0.160)	0.72 (0.087, 2.620)	1.19 (0.14, 4.29)	0.895 (0.02, 4.98)	zero occurrence
Tehran					
Male	0.005 (0.001,0.011)	2.55 (1.46,4.15)	8.98 (6.15,12.68)	28.16 (21.54,36.17)	39.13 (26.21,56.19)
Female	0.028 (0.003,0.102)	0.16 (.00,0.09)	1.82 (0.66,3.97)	6.62 (3.53,11.32)	12.11 (5.54,22.99)
Kerman					
Male	0.217 (0.070,0.507)	4.72 (1.73,10.72)	8.35 (3.06,18.16)	20.52 (10.24,36.72)	28.04 (10.29,61.02)
Female	0.045 (0.001,0.250)	0.801 (0.02, 4.46)	zero occurrence	4.67 (0.56-16.86)	11.3 (1.37,40.80)
Khorasan					
Male	0.233 (0.085,0.507)	1.74 (0.35,5.08)	21.01 (13.46,31.26)	19.90 (11.37,32.31)	39.25 (20.28,68.55)
Female	zero occurrence	1.10 (0.133, 3.97)	4.38 (1.42,10.23)	8.45 (3.10,18.38)	23.63 (8.67,51.43)
Isfahan					
Male	0.229 (0.084,0.499)	5.62 (2.90,9.81)	20.99 (13.71,30.75)	56.50 (41.80,74.68)	72.16 (46.24,107.34)
Female	zero occurrence	0.98 (0.11, 3.55)	1.67 (0.20, 6.02)	9.93 (4.29,19.56)	31.06 (14.89,57.11)

1.16 in Shiraz, 0.54 in Kermanshah, 0.51 in Ahvaz, 0.23 in Tabriz, 0.46 in Tehran, 0.28 in Kerman, 0.64 in Khorasan, and 0.86 in Isfahan.

Given the estimated mortality rates according to age groups and gender, Table-1 shows the results of mortality rates in nine provincial poles across Iran. The mortality rates were drastically higher in men compared to women; the lowest mortality rate in men was observed in patients younger than 50 years of age. The rates of death due to bladder cancer are shown in Table 1. The lowest mortality rate was seen in Tehran pole (rate: 0.005, 95%CI: 0.001, 0.011) and the highest rate was seen in Mazandaran pole (rate: 0.94, 95%CI: 0.19, 2.77).

The lowest risk of death in men whom their age was between 51-60 years old, was reported from Khorasan pole (rate: 1.74, 95%CI: 0.35, 5.08) and the highest risk of death was reported from Isfahan pole (rate; 5.62, 95%CI: 2.90, 3.55). The lowest risk of death in men whom their age was between 61-70 years old was reported from Tabriz (rate: 1.66, 95%CI: 6.32, 16.85) and the highest was reported from Khorasan pole (rate: 21.01, 95%CI: 13.46, 31.26). The lowest risk of death in men whom their age was between 71-80 years old, was reported from Tabriz pole (rate: 14.97, 95%CI: 9.01, 23.37) and the highest was reported from Isfahan pole (rate: 56.50, 95%CI: 41.80, 74.68). Finally, the lowest risk of death in men older than 80 years old was reported from Kerman pole (rate: 28.04, 95%CI: 10.29, 61.02) and the highest was reported from Ahvaz pole (rate: 121.68, 95%CI: 74.34, 187.86) (Table 11). The highest and lowest male-to female ratio of death due to bladder cancer was observed in patients aged 61-70 years old (5.99) and less than 50 years (2.63) (Figure 3).

4. Discussion

According to the recent reports from the Ministry of Health and Medical Education in Iran; the most common causes of death in Iran are coronary heart disease, accidents and cancers, respectively (12). Cancer is a major public health concern in the world (5). Bladder Cancer (BCa) is the most common malignancy of the urinary tract mainly in developing countries (12), with annual mortality rates ranging from 1–5 deaths per 100,000 men and 0.5–1.5 deaths per 100,000 women (9).

Up to now, few studies have been conducted on the epidemiology of bladder cancer in Iran. Our study was conducted on 3946 registered cases of BCa through the national cancer registry in Iran. Out study showed that death due to BCa was recorded more frequently among males. The higher mortality rate of BCa in men might be due to some masculine high-risk profile such as tobacco consumption and exposure to occupational hazards, which expose men to higher risk of cancer-related morbidity and mortality. For instance, the results of several national surveys in Iran have shown that the prevalence of cigarette smoking is higher among men and 0.3% among women) (13, 14). In terms of opium consumption, Kerman Province is ranked the fifth in the country (12). Since most opium consumers are men, this may explain the higher risk of death due to bladder cancer in men in Kerman compared to the rest of the country.

This study showed that most bladder cancer tumors were superficial and low grade in Iran, which was consistent with the findings of other studies in the world (15). The rate of bladder cancer mortality; however, differs among provinces that can be attributed to several factors such as access to medical care services (10), education, level of income (16), stage and grade of diagnosed bladder cancer (17) and age (16). Mahdavifar et al. showed that not only there was a positive linear relationship between the incidence of BCa and Health developmental index (HDI)(r=0.653, P<0.001), but also a positive linear relationship was revealed between the mortality rate of BCa and HDI (r=0.308, P<0.001)(18). Pakzad, et al showed that despite the growing incidence of bladder cancer in developing countries, there was no statistically significant correlation between the incidence rate of bladder cancer and HDI and its components in Asia, except for the level of education (16). Our study showed that some provinces such as Kerman with low HDI has the lowest mortality rate; while mortality rate in some other provinces such as Isfahan and Ahvaz was the highest. Hence, there seemed to be no apparent correlation between HDI and mortality rate due to bladder cancer.

Our study showed that increasing age is associated with increased mortality of bladder cancer which was consistent with other studies (16).

5. Conclusion

According to our results, the mortality rate of bladder cancer is increasing with age in Iran. This increasing trend may be due to increased prevalence of certain risk factors accompanied with economic development, and advancement in the national cancer registration system. The information on the incidence and mortality of bladder cancer, and its distribution

6. Acknowledgment

7. Conflict of interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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9. Author's contributions

All the authors have the same contribution.

10. Reference

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