

ONCOLOGY/RECONSTRUCTION
ORIGINAL ARTICLE

Preliminary study of prevalence for bladder cancer in Isfahan Province, Iran

Hamid Mazdak^{a,b}, Zahra Tolou-Ghamari^{a,*}

^a Isfahan Kidney Transplantation Research Center, Alzahra Research Centers, Isfahan University of Medical Sciences, Isfahan, Iran

^b Department of Urology, Isfahan University of Medical Sciences, Isfahan, Iran

Received 11 July 2017, Received in revised form 9 October 2017, Accepted 25 November 2017

Available online 17 January 2018

KEYWORDS

Bladder;
Cancer;
Incidence;
Prevalence;
Isfahan

ABBREVIATIONS

BC, bladder cancer;
PP, period prevalence;
Ir, incidence rate

Abstract Objectives: To clarify period prevalence (PP), incidence rate (Ir), and reported mortality for patients with bladder cancer (BC) in Isfahan Province/Iran, as BC is the most common cancer of the urinary tract in Iran and other parts of the world.

Patients and methods: Data from 21 March 2011 to 3 March 2015 was obtained from the Isfahan Cancer Registry. BC was distinguished by the related established topography code (C67). Ir and PP were calculated and expressed per 100 000 persons.

Results: In all, 279 females and 1376 males were identified. For the total population the PP was calculated as 33.2. This value corresponded to a PP of 54.4 for males and 11.4 for females ($P < 0.001$). Histologically, 63% of patients had invasive BC. Irs versus mortality rates were calculated for each year, i.e. 2011–2012, 2012–2013, 2013–2014, and 2014–2015, as 7.7 vs 0.56, 8.1 vs 0.74, 7.4 vs 0.98, and 9.9 vs 0.84, respectively. The mean (SD, range) age of the patients was 65.2 (13.9, 3–100) years. In relation to the age of the study population, BC occurred in 12% of patients aged < 50 years and in 15% of those aged ≥ 80 years.

Conclusion: The PP for BC in the male population was 4.8-times higher than females. There was a 28.6% increase in the Ir over the study period. Further study

* Corresponding author at: Isfahan Kidney Transplantation Research Center (IKTRC), Deputy of Research, Isfahan University of Medical Sciences, Isfahan, Iran.

E-mail address: toloughamari@pharm.mui.ac.ir (Z. Tolou-Ghamari).

Peer review under responsibility of Arab Association of Urology.



Production and hosting by Elsevier

concerning environmental exposure, genetic factors, job-related exposure to various chemical carcinogens, and geographical distribution in Isfahan and its' rural provinces would seem to be valuable.

© 2017 Production and hosting by Elsevier B.V. on behalf of Arab Association of Urology. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Bladder cancer (BC) is the most common urinary tract cancer worldwide and its' incidence is rapidly increasing in underdeveloped countries [1,2]. About 2–6% of total malignant tumours are BC, which makes it the fourth most common cancer in males and eighth in females [3]. In the USA, BC prevalence in males is four-times that in females [4]. For the Iranian population with BC, a 2015 publication reported that the bladder was one of the most common malignancy sites amongst men in Iran, with BC ranking as the fifth most common with an age-specific incidence rate (Ir) of ~11.2 per 100 000 males. Another epidemiological study for the years 2003–2008, confirmed a rise in the age-standardised Ir of BC in Iran [5,6].

Associated with the risk of BC, Hadkhale et al. [7] in 2016 provided an indication of the consequences of work-related contact to trichloroethylene, perchloroethylene, aromatic hydrocarbon solvents, benzene, and toluene. A study performed in an Iranian population with BC and controls, showed a higher risk to BC amongst bus and truck drivers, road construction workers, mechanics, refinery and petrochemical workers, plastic, metal manufacturing, welding, and pipeline workers [8].

Owing to the significant impact on healthcare cost because of the need for frequent and long-term cystoscopic examination, the main aim of the present investigation was to provide a preliminary survey of epidemiological data related to patients with BC in Isfahan Province/Iran.

Patients and methods

Ethical approval

This retrospective study was approved by the Institutional Review Board (No. 295115). The study was conducted at the Isfahan Kidney Transplantation Research Center (IKTRC). BC data from 21 March 2011 to 3 March 2015 were obtained from the Isfahan Cancer Registry, located at the Isfahan Deputy of Health. The Isfahan Cancer Programme is intended to record all cancer cases in the Isfahan. The management arm of the programme is the deputy of research in the Isfahan University of Medical Sciences.

Data analysis

The cancer sites studied were defined according to the International Classification of Diseases (ICD-O; third edition). BC was distinguished by the topography code C67. To clarify invasive or non-invasive neoplasms, the monography code was used for tumour description including cell type. Collected coded data were linked using the de-identified patients' name and surname. In the next step, the code for each patient, father's name, age, gender, pathology report and its' date, topography and monography code were recorded in Excel.

Statistical analysis

Microsoft Excel was used to arrange raw data before being inputted into the Statistical Package for Social Science (SPSS® version 20; IBM Corp., Armonk NY, USA) for analysis. Age, as a continuous variable, was expressed as mean \pm standard deviation (SD). The normality distribution of age was tested using the Kolmogorov–Smirnov test. Variables such as gender, alive/dead, type of BC, year of report were expressed by frequency, percentage, period prevalence (PP) and Ir.

As the data were related to BC occurrence, therefore, normality distribution test of the patient population was studied only in comparisons associated with the age of males and females. In order to examine the differences between age and PP with gender the *t*-test and chi-squared test were used.

The total population of Isfahan City was obtained from the Isfahan/Program and Budget Management Organization. The PP was calculated as the proportion of the total cases over the period 2011–2015/to population at risk during the same period \times 100 000. The Ir was calculated by dividing new cases of BC during a given time period/to the population at risk during the same time period \times 100 000 [9–11].

Results

Demographic and epidemiology characteristic of patients with BC are shown in Table 1. There were 1655 recorded cases, in which 83% were males.

Normality distribution of age was tested by the Kolmogorov–Smirnov test. The mean (SD; range) age was 65.2 (13.9; 3–100) years. The mean age of patients was

higher in women than in men (t -test; $P < 0.007$). As shown in Fig. 1, most incidences of BC (95%) occurred between the ages of 40–90 years.

Histologically, of the total population studied, 63% had invasive neoplasms and 37% were non-invasive.

The PP was significantly different between males and females (chi-squared test; $P < 0.001$). With a total PP of 33.2 per 100 000 persons, the prevalence in males (54.4 per 100 000) was 4.8-times than that in females (11.4 per 100 000 persons). Fig. 2 shows the Irs for BC between the years 2011–2015. The Ir for the related years of study was 7.7, 8.1, 7.4 and 9.9 per 100 000 persons, respectively. There were 156 recorded deaths (9%); 41 females and 115 males. Fig. 3 shows the mortality data for the years 2011–2015, in which estimated mortality Irs changed from 0.56 to 0.74 to 0.98 to 0.84 per 100 000 persons, respectively.

Discussion

Cancer is a leading cause of morbidity and mortality in the USA and results in a high economic burden [12]. Likewise according to published articles, cancer could be considered as a major public health problem in Iran too [13–15]. Furthermore, BC is reported to be the ninth most common cancer and the fourteenth leading cause of death from cancer worldwide [16].

In the present study, the PP from March 2011 to March 2015 was 33.2 per 100 000 persons in Isfahan Province. This is comparable to the results obtained in 2012 in a study of 429 793 patients with BC, in Belgium, Lebanon, Malta, Turkey, and Denmark, with the highest age-standardised Ir reported for Belgium [16]. The correlation between ageing and cancer is well represented in BC, as with advancing age, the risk of developing BC increases, and patients' clinical presentation and outcomes worsen [17]. In agreement with previous reports, 86% of all BC cases were aged > 50 years [1–19].

In addition the result of the present study confirmed a 28.6% increase in Ir from 7.7 to 9.9 per 100 000 persons from 2011 to 2015 in Isfahan Province. This is in agreement with a publication that stated BC incidence is higher in developed countries, but the amount is decreasing, and in less industrialised and developing countries it is increasing [17].

Regarding the sex ratio, the result obtained from the present study showed that the prevalence of BC was 4.8-times more in men than in women ($P < 0.001$), which reflected a 20% increase in reported prevalence of BC in the male population in Isfahan/Iran when compared to previous published studies that were associated with a four-times higher in prevalence of BC in males [1–4]. Study data obtained from Asian countries in 2012 involving 696 231 BC cases were comprised of 68.7% males and 31.3% females (sex ratio of 2.19:1) [18], which is nearly half of that of the ratio found in the present study. In the present study, of a total population of 1655 BC cases, 63% were invasive neoplasms and 37% were non-invasive. Gupta et al. [19] in 2009 reported that BC was three-times more common in men than in women, in which 90% of the BC was TCC.

Regarding mortality, Mahdifar et al. [16] in 2016 confirmed that the incidence of BC in developed countries and parts of Africa was higher; however, the highest mortality rate was seen in the North Africa and Middle East region. A study of trends and patterns of disparities in cancer mortality amongst USA counties by Mokdad et al. [12] in 2017, showed a decline in cancer mortality between 1980 and 2014.

In the present study, the mortality Ir in the years 2011–2015 changed from 0.56 to 0.74 (increase by 32.1%) to 0.98 (increase by 32.4%) and 0.84 (decrease by 14.3%) per 100 000 persons. Regarding the study of mortality, the Iranian Cancer Registry collect all data related to recorded patients with cancers. In addition, as a part of collaboration within different Government Agencies, cemetery organisations are obliged to report death from cancer to the cancer registry office. The reported mortality in the present study was based on data from the recorded databases of the cancer registry office obtained from the graveyard organisation. Further study would be valuable to establish the underlying reasons for the correlation between mortality and BC.

According to the outcomes of the present investigation, different features for access to specialised medical, pharmacological and surgical facilities could be mentioned as the main limitations of this study. Giving consideration towards the reality of scheduling health system improvements, particularly referral systems, could be helpful in preventing significant difficulties in

Table 1 Demographic and epidemiological characteristics of the patients with BC.

Population studied	<i>N</i>	ELC, <i>n</i>	ED, <i>n</i>	Age, year, mean (SD)	PP	Ir (%)			
						2011–2012	2012–2013	2013–2014	2014–2015
Total	1655	1499	156	65.2 (13.9)	33.2	7.7	8.1	7.5	9.9
Females	279	238	41	67.1 (14.5)	11.4	2.8	2.7	2.5	3.34
Males	1376	1261	115	64.8 (13.8)	54.4	12.8	13.5	12.2	15.9

ELC, estimated living cases; ED, estimated death.

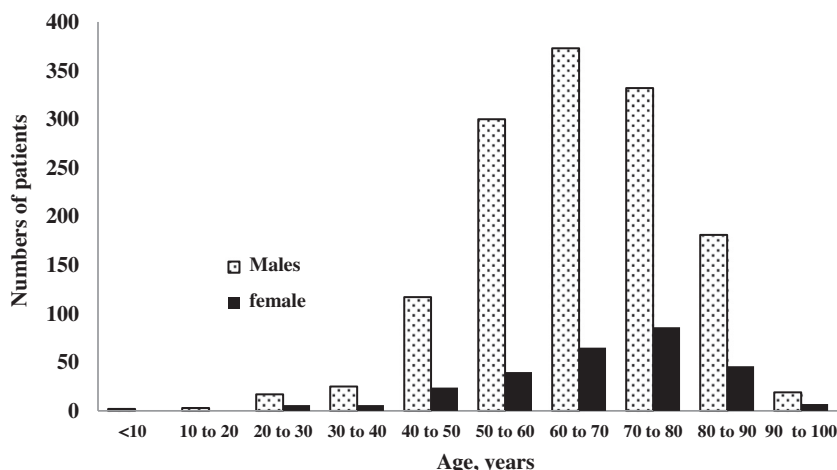


Fig. 1 BC distribution according to the age and gender of the patients.

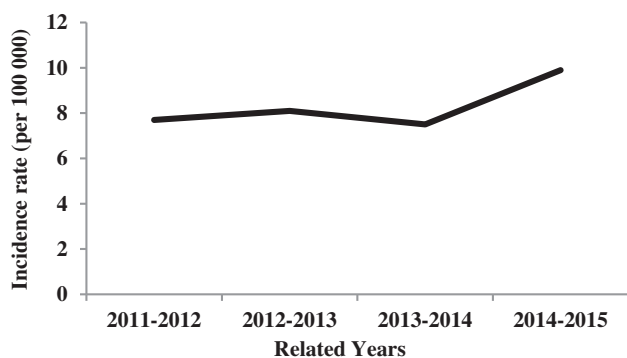


Fig. 2 Irs for BC from the years 2011–2015.

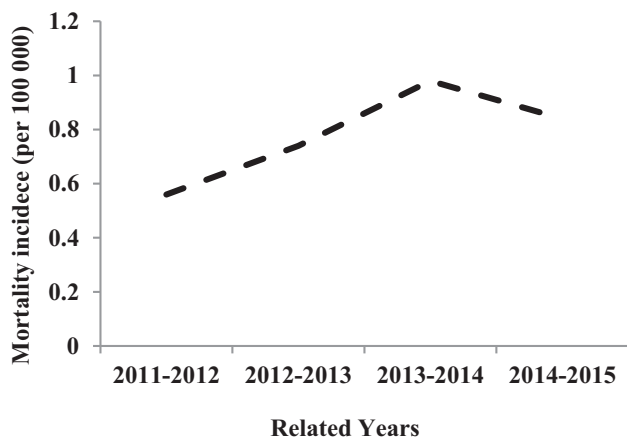


Fig. 3 Estimated Ir of death from BC.

management equality, patient satisfaction and finance aspects of the Iranian health system.

Conclusion

For the 1655 patients with BC (2011–2015) in Isfahan Province/Iran, with a mean age of 65.2 years, most inci-

dences (86%) were seen in those aged > 50 years. The PP (per 100 000 persons) at 33.2 was 4.8-times higher in males (54.4) than females (11.4), which was significant ($P < 0.001$). The Ir (per 100 000 persons) increased by 27.3%, from 7.7 to 9.8 for the studied years.

Conflicts of interest

There is not any conflict of interest.

Funding source

None.

Contributors' statements

H. Mazdak: Contributed to the conception of the work, conducting the study and revising the draft.

Z. Tolou-Ghamari: Contributed to the conception of the work, conducting the study and revising the draft.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Ethical statement

This study was conducted in accordance with the Declaration of Helsinki and its amendments, and after obtaining institutional ethics approval (Code No. 295115).

Acknowledgements

None.

References

- [1] Silverman DT, Hartge P, Morrison AS, Devesa SS. Epidemiology of bladder cancer. *Hematol Oncol Clin North Am* 1992;6:1–30.

- [2] Pashos CL, Botteman MF, Laskin BL, Redaelli A. Bladder cancer: epidemiology, diagnosis, and management. *Cancer Pract* 2002;**10**:311–22.
- [3] Rugo HS. Occupational cancer. In: Ladou J, editor. *Current occupational and environmental medicine*. 3rd ed. New York: McGraw-Hill Companies Inc.; 2004. p. 229–68.
- [4] Ruder AM, Carreon T, Ward EM. Bladder cancer. In: Rosenstock L, Cullen MR, editors. *Clinical occupational and environmental medicine*. 2nd ed. Philadelphia: Elsevier; 2005. p. 757–66.
- [5] Payandeh M, Sadeghi M, Edris Sadeghi E. Characteristics of patients with transitional cell carcinoma of the urinary bladder in Kermanshah Province, Iran. *Iran J Cancer Prev* 2015;**8**:e4038. <https://doi.org/10.17795/ijcp-4038>.
- [6] Rafiemanesh H, Lotfi Z, Bakhtazad S, Ghoncheh M, Salehiniya H. The epidemiological and histological trend of bladder cancer in Iran. *J Cancer Res Ther* 2017 [Epub Ahead of Print]. <http://www.cancerjournal.net/preprintarticle.asp?id=172134;type=0>.
- [7] Hadkhale K, Martinsen JI, Weiderpass E, Kjaerheim K, Sparen L, Tryggvadottir L, et al. Occupational exposure to solvents and bladder cancer: a population-based case control study in Nordic countries. *Int J Cancer* 2017;**140**:1736–46. <https://doi.org/10.1002/ijc.30593>.
- [8] Aminian O, Saburi A, Mohseni H, Akbari H, Chavoshi F, Akbari H. Occupational risk of bladder cancer among Iranian male workers. *Urol Ann* 2014;**6**:135–8.
- [9] Hashad MM, Abdeldaeim HM, Moussa A, Assem A, Youssif TM. Bipolar vs monopolar resection of bladder tumours of > 3 cm in patients maintained on low-dose aspirin: a randomised clinical trial. *Arab J Urol* 2017;**15**:223–7.
- [10] Tolou-Ghamari Z, Shaygannejad V, Ashtari V. Preliminary study related the incidence of methylprednisolone pulse therapy in patients visited multiple sclerosis clinic located at the Isfahan Kashani Hospital. *Int J Prev Med* 2013;**4**(Suppl. 2):S274–8.
- [11] Tolou-Ghamari Z. A Review of geoepidemiological differences of multiple sclerosis in Iran and other Middle East countries. *Arch Neurosci* 2015;**2**:e22028. <https://doi.org/10.5812/archneurosci.22028>.
- [12] Mokdad AH, Dwyer-Lindgren L, Fitzmaurice C, Stubbs RW, Bertozzi-Villa A, Morozoff C, et al. Trends and patterns of disparities in cancer mortality among US Counties, 1980–2014. *JAMA* 2017;**317**:388–406. <https://doi.org/10.1001/jama.2016.20324>.
- [13] Enayatrad M, Mirzaei M, Salehiniya H, Karimirad MR, Vaziri S, Mansouri F, et al. Trends in incidence of common cancers in Iran. *Asian Pac J Cancer Prev* 2016;**17**:39–42.
- [14] Salehiniya H, GhobadiDashdebi S, Rafiemanesh H, Mohammadian-Hafshejani A, Enayatrad M. Time trend analysis of cancer incidence in Caspian Sea, 2004–2009: a population-based cancer registries study (northern Iran). *Caspian J Intern Med* 2016;**7**:25–30.
- [15] Rafiemanesh H, Mehtarpoor M, Mohammadian-Hafshejani A, Salehiniya H, Enayatrad M, Khazaei S. Cancer epidemiology and trends in Sistan and Baluchestan province. *Iran. Med J Islam Repub Iran* 2015;**29**:254.
- [16] Mahdifar N, Ghoncheh M, Pakzad R, Momenimovahed Z, Salehiniya H. Epidemiology, Incidence and Mortality of Bladder Cancer and their Relationship with the Development Index in the World. *Asian Pac J Cancer Prev* 2016;**17**:381–6.
- [17] Taylor 3rd JA, Kuchel GA. Bladder cancer in the elderly: clinical outcomes, basic mechanisms, and future research direction. *Nat Clin Pract Urol* 2009;**6**:135–44.
- [18] Pakzad R, Mohammadian-Hafshejani A, Mohammadian M, Pakzad I, Safiri S, Khazaei S, et al. Incidence and mortality of bladder cancer and their relationship with development in Asia. *Asian Pac J Cancer Prev* 2015;**16**:7365–74.
- [19] Gupta P, Jain M, Kapoor R, Muruganandham K, Srivastava A, Mandhani A. Impact of age and gender on the clinicopathological characteristics of bladder cancer. *Indian J Urol* 2009;**25**:207–10.