Age, Sex and Site Specific Incidence of Cancer in Kohgilooyeh and Boyerahmad- Iran: A Province with Low Cancer Incidence (2007-2009)

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Abstract

Background: Cancer is the third cause of death in Iran and its incidence is rising alarmingly. However, a study reported that Kohgilooyeh and Boyerahmad (a small province in Iran) seems to have substantially lower incidence rate of cancer compared to the other parts of the country. This study is conducted to investigate the epidemiological features of cancer regarding three key factors (sex, age and sites of cancer).

Methods: The data collection strategy for this study is similar to the Iranian National Cancer Registry programme.

Results: For the study period (2007-2009), 660 eligible cases of cancer were reported to Kohgilooyeh and Boyerahmad's National Cancer Registry provincial office with average annual age standardized rate (ASR)=64.58 per 100000 (74.95 per 100000 and 45.85 per 100000 for men and women, respectively). The five leading primary cancer sites for both genders in K and B are skin, stomach, blood, bladder and breast. Regarding the sex specific incidence rates of cancer, the skin, stomach, bladder, blood and prostate in men and the skin, breast, stomach, blood and ovary in women are suggested to be the five leading sites of cancer. The trends of age-site specific incidence rates of skin cancer obtained in the current study are essentially similar to what is expected.

Conclusion: Compared to the national and international figures, significant differences were found in the age-site specific rates of cancer in the province.

Introduction

According to the Iranian national cancer statistics, cancer is the third cause of death in the country.[1] Based on the same source of data, the incidence of cancer in Iran is believed to be rising considerably.[2,3] Epidemiology of cancer is essential for understanding the aetiology of the disease and finding feasible control measures. As to other diseases, among many associated factors, sex and age are considered as the key elements of any epidemiological study on cancer aetiology and prevention.

A published article based on the official report from Iranian NCR office on 2006 suggested that Kohkilooyeh and Boyerahmad (K and B, a small province located at southern part of the country with about 630000 population) has considerably lower incidence rate of almost all types of cancer compared to its neighbours and national figures.[1] Although several etiological reasons including less

environmental pollution and less-westernized lifestyle may be used to justify this phenomenon, the clearly lower incidence of cancer in K and B is still a matter of concern. The aim of this study was to estimate the basic epidemiologic indices of cancer in K and B for a 3-year period from year 2007 to 2009 using the same data sources and strategies as used by Iranian NCR. This three year population-based cohort study aimed to estimate sex and age specific incidence rates for the five most prevalent types of cancer in both genders. The results of this study will contribute to better understanding of the epidemiology of the third most common causes of death in Iran.

Methods

Data Source

As many other countries, the national cancer registry (NCR) program in Iran is set to collect data on cancer on a provincial and national level. According to a bill passed by the Iranian parliament regarding the NCR program, all private and public pathology and histology labs as well as hospitals have to report cases diagnosed with or died of cancer. The history and details of cancer registry and its procedures in Iran have previously been described.[4,5] Briefly, basic pathology and demographic information is extracted from the patient's file via a specially designed cancer registry data collection form. Although the pathology centers report cancer cases on a monthly basis, provincial and national NCR offices spend several years to complete the whole process of collection, coding (based on ICD9), entry and quality control of the data. The data provided by NCR is officially considered valuable and reliable for authorities and researchers who work on epidemiology and control of cancer (Sadjadi et al. 2008).

The data collection strategy for this study is similar to the NCR programme. Accordingly, from 2007 to 2009 the positive results of all pathology tests for cancer were collected from lab centres based in the province. In 2012 (local cancer registry office normally takes about two years to collect and complete the required information from hospitals and labs), all the registered cases during the study period were cross-checked for duplicates andonly primary site cancers remained in the data set for analysis. ICD codes were rechecked by an experienced coder to confirm the attached codes to the patients' information.

Study Population

All cases were reported to be the residences of K and B province when pathology samples were taken. Information about the size and combination of population during the study period were obtained from the Statistical Centre of Iran's official report.[6]

Data Analysis

In order to avoid instability of the site specific rates, data for the whole study period (3 years) were used to calculate the incidence rate of cancer. All figures represent age-sex specific incidence rates. Standardization for sex specific rates was done using WHO's standard population[1].Analysis was done in Microsoft Excel.

Results

K and B is a small province located at the middle-south of Iran with about 630000 population.[6] For the study period (2007-2009), on average each year220eligible cases of cancer were reported to K and B NCR provincial office with an average annual rate of 34.68 per 100000 (43.41 per 100000 and 25.75 per 100000 for men and women, respectively).The average age of cancer diagnosis was 58.11 for both genders (60.63 for males and 53.75 for females, P<0.001). For both genders, the average age at diagnosis was substantially different by the sites of cancer (P<0.001). In females, the oldest and youngest ages at diagnosis were for bladder (73.37 years, n=8) and for lymph node (32.20 years, n=5), respectively (Table 1). In males, the oldest and youngest ages at diagnosis were for esophagus (70.89 years, n=18) and brain (37.89 years, n=9), respectively (Table 1).

Age specific rates of the five most common sites of cancer (in a descending order: skin, stomach, bladder, colorectal, oesophagus) are presented in Figures 1 and 2.

According to the pattern of age-sex specific incidence of skin cancer presented in Figure 1, skin cancer (also the most common type of cancer in both sexes in Iran and K and B province)first started to rise at about the age of 30 years. The second dramatic change in the pattern happened at about age 50 years with a sharp rise till it reached the pick at about the age of 75 and 70 years for males and females, respectively. The mean age of diagnosis for skin cancer in both genders was about 63.47 years (mean=60.08 and SD=16.23 for females compared to mean=65.72 and SD=12.44 for males, P=0.0086).The trend of age-specific rates of skin cancer for males and females was similar till age 70 years at which a significant diversity started (Figure 1). The age-specific patterns of other four most common sites of cancer are presented in Figure 2, with no gender specific cancer site among them.

The Figure suggests a relatively similar rising age (about 30-40 years) and downward trends at older ages for all sites except for breast cancer with a sharp rise at 80-84 years of age.

The age-site specific incidence rates of cancer for the four most common sites are presented for males and females separately in Figures 3 and 4.

Table 1: Mean age at diagnosis by the site of cancer and sex

Site	ICD Code	M & F (3 years)			Female (3 years)			Male (3 years)		
		Cases	Mean	SD	Cases	Mean	SD	Cases	Mean	SD
Unknown	----------	5	52.60	27.15	2	23.50	10.61	3	72.00	2.65
Cervix uteri	C53-C55	6	50.17	8.31	6	50.17	8.31	0	-	-
Larynx	C32	8	55.62	10.14	0	-	-	8	55.62	10.14
Kidney	C64-C65	11	58.55	17.62	3	67.67	12.74	8	55.12	18.65
Ovary	C56	12	45.75	23.83	12	45.75	23.83	0	-	-
Brain	C70-C72	14	42.29	13.60	5	50.20	11.43	9	37.89	13.21
Soft tissue	C49	14	46.79	20.12	6	45.33	20.99	8	47.88	20.84
Lymph node	C77	17	36.88	19.39	5	32.20	17.25	12	38.83	20.60
Unspecified	C26,C76,C80	25	56.28	20.28	4	52.75	24.80	21	56.95	19.96
Esophagus	C15	26	66.77	14.92	8	57.50	17.30	18	70.89	12.06
Colon rectum	C18-C21	27	57.73	16.85	9	61.22	14.58	18	55.88	18.08
Prostate	C61	28	69.39	12.56	0	-	-	28	69.39	12.56
Breast	C50	30	49.67	13.91	30	49.67	13.91	0	-	-
Bladder	C67-C68	44	63.7	15.23	8	73.37	6.44	36	61.56	15.83
Blood	C42	47	46.23	24.48	18	46.78	23.65	29	45.90	25.38
Other	See the footnote^	57	49.85	22.15	29	45.98	24.11	28	53.82	19.01
Stomach	C16	106	63.30	15.91	24	56.79	17.96	82	65.21	14.85
Skin	C44	183	63.47	14.30	73	60.08	16.23	110	65.72	12.44
total		660	58.11	18.65	242	53.75	18.63	418	60.63	18.21

^C17,C21,C24, C37, C52, C58, C60, C68, C69, C74-C76
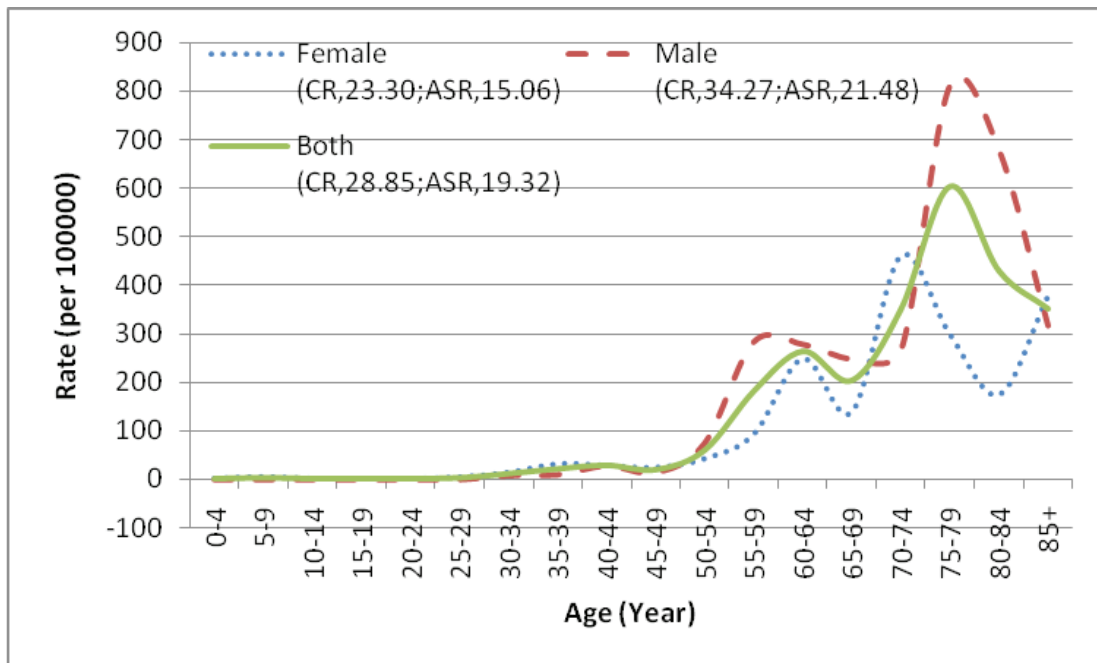

Figure 1: Age specific incidence of skin cancer (the leading site) by sex in 2006-2009

According to Figure 3, after skin cancer, stomach, bladder, blood and prostate are the most common sites of cancer in men. In contrast, as shown in Figure 4, the most common sites after skin in women consists of breast, stomach, blood and ovary.

Removing sex-related types of cancers (breast and, ovary) from analysis and comparing the incidence rates of the rest of common cancers between two sexes suggests significantly higher risks for male for bladder (P<0.001), skin (P<0.001) and stomach cancers (P<0.001).Blood cancer seems to affect males and females similarly (P=0.12).

Discussion

Kohkilooyeh and Boyerahmad is a small province located at the middle south of Iran. This is a three year population-based cohort study to describe the status of most common cancers according to the three key factors in cancer epidemiology, namely the site of cancer, age and sex of the patients. The five leading primary cancer sites for both genders in K and Bare skin, stomach, blood,
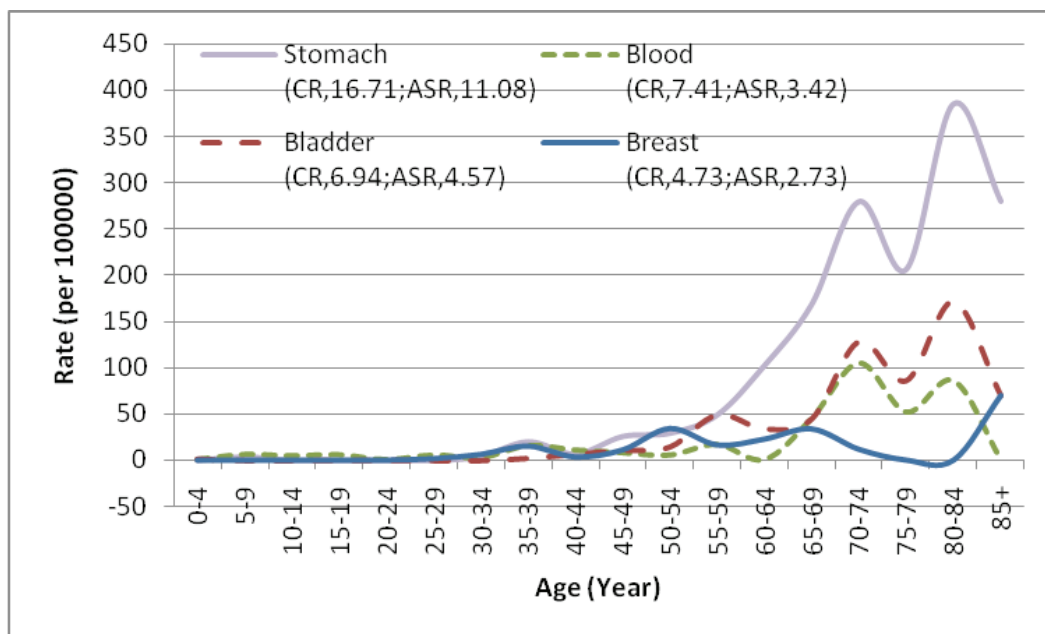
Figure 2: Age specific incidence of four leading sites of cancer (except skin, both genders)2006-2009
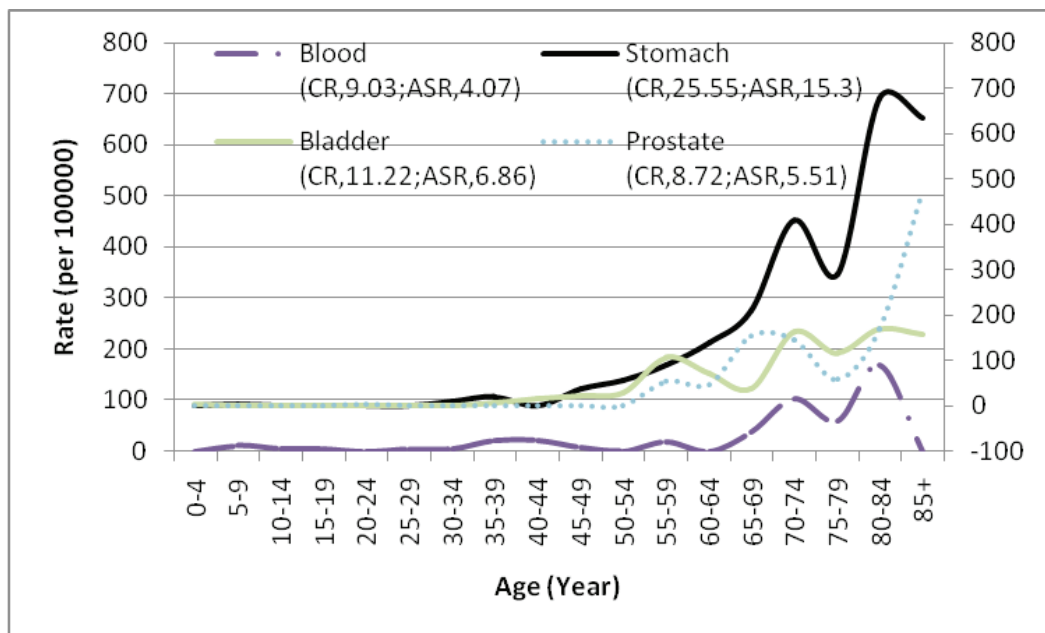

Figure 3: Age-site specific incidence of four leading sites (except skin) of cancer in men 2006-2009

bladder and breast. Regarding the sex specific figures of cancer provided in the results section, skin, stomach, bladder, blood and prostate in men and the skin, breast, stomach, blood and ovary in women are the five leading sites of cancer. Comparison of the results of the current study with the corresponding figures from published studies which were carried at national level in Iran or some other Asian or Western countries suggests both relative similarities or substantial differences in the list of the five leading sites of cancer. For example, according to a report published based on the Iranian national cancer registry database,(the current study used similar sources and methods of data collection) the skin, stomach, breast, colon and rectum and oesophagus are

the most common sites of cancer in Iran.[1] According to this article, skin, stomach, bladder, prostate and colorectal cancers among men, and skin, breast, colon and rectum, stomach and oesophagus among women are the leading sites of cancer in the Iranian population. Comparisons of the sex-site specific rates of cancer for K and B with their corresponding national figures from Mousavi and colleagues' study indicated significant differences in the order of common sites of cancer. Comparison of the national sex-site specific rates with their corresponding rates in K and Brevealed that blood cancer in both genders are among the five leading sites in the residences of K and B province, whereas colorectal and oesophagus(the fourth and fifth most common
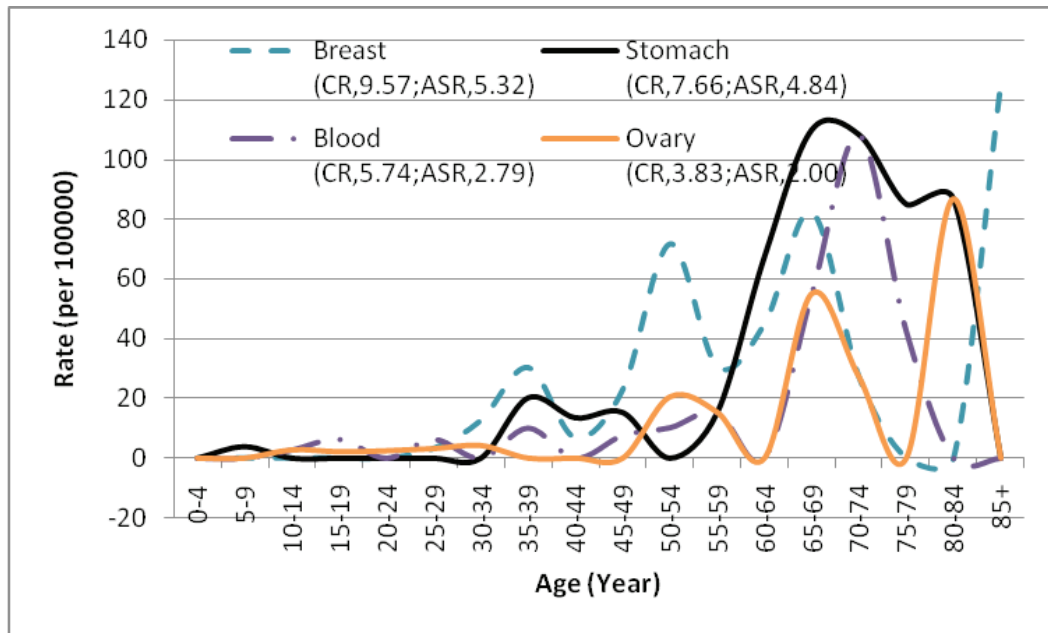
Figure 4: Age-site specific incidence of four leading sites (except skin) of cancer in women 2006-2009

cancers in Iran) are missing from the list of top five for K and B. No comparison could be made regarding age-site specific rates as the required figures for the national level are not provided by Mosavi and colleagues. The list of five most common sites of cancer in K and B was also compared with an (East) Asian country. According to an article published by Jong and colleagues, the five leading cancer sites among Korean population in 2009 are thyroid, stomach, colon and rectum, lung, and liver,7 suggesting a substantial difference with the corresponding figure for Iran[1] and the results of the current study in K and B province. According to Jong and colleagues' study, the stomach, colorectal, lung and liver and prostate in men and the thyroid, breast, colorectal, stomach, lung and liver in women were the five leading sites of cancer in Korea. The comparison of the results of this Korean study with what was obtained by the current research in K and B again suggests dramatic differences in the most common sites of cancer especially in women, suggesting major differences in the aetiology of cancer between the two types of population.

The comparison of the results of the current study with the corresponding figures from a study on the epidemiology of cancer in the USA suggests similarities as well as differences.[8] According to this American study, the lung, prostate, skin, colon and bladder are the most common sites of cancer. Irrespective of the order of the sites, two of five leading sites of cancer in the US and K and B (stomach and bladder)are similar. However, the five leading sites among females in the US are again substantially different from the current study. The trends of age-site specific incidence rates of skin cancer obtained in the current study are essentially similar to what is reported by other studies.[7,8] The sudden fall and rise of the incidence of skin cancer from age70 to 80 years in women is the only exception which may be justified by the relatively limited number of incident cases and, therefore, unstable age-sex specific rates. With regard to the age of diagnosis, the results suggested that women are diagnosed with cancer at significantly younger age. Whether this is due to faster diagnosis or earlier incidence among women is a matter of further investigation.

Lower incidence rate of cancer in K and B province and the substantial differences in common sites of cancer compared to the national and international figures is significant and needs further specially designed investigations to find out the actual reasons for these phenomenon. As Iranian NCR is lately established and is fast improving, the effect of disproportional cancer detection and underreporting on the above findings could not be ruled out.

Limitations: Although the data used in this study was provided by the provincial NCR office which is the official source of data for national cancer statistics [1], like many other NCR databases, problems like under-reporting, incorrect reporting of patients' residential addresses or misdiagnosis are not to be ignored when interpreting the results. Although the lower rate of cancer in K and B compared to the national figures was also reported by another study based on the national population based cancer registry database,[1] the issue is still a matter of concern. Due to the small population size, the age, sex and site specific rates in K and B are unstable. As the result, three years of incidence rates were calculated and used in this study.

Ethical approval: Approved by Yasuj University ethics committee

Conflict of Interest: None declared.

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