

## RESEARCH ARTICLE

# Demographic Survey of Four Thousand Patients with 10 Common Cancers in North Eastern Iran over the Past Three Decades

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### Abstract

**Background:** Cancer is a major cause of mortality in developing countries and correct and valid information about the epidemiology of this disease is the first step in the planning of health care in each region. The aim of this study was to determine the relative frequency, mean age and sex ratio of the most 10 common non-skin cancers in the world and Iran, among patients referred to an oncology clinic. **Materials and Methods:** This descriptive study was conducted in Mashhad, north east of Iran. The data obtained from the records of patients referred to the private oncology center between the years of 1985-2012." According to the latest report of GLOBOCAN study commonest malignancies included were lung, breast, colorectal, prostate, stomach, liver, cervix, esophageal, bladder cancers and Non-Hodgkin lymphoma. **Results:** A total of 4,606 cases were analyzed. The mean age was  $55.5 \pm 13.8$  years (male:  $59.5 \pm 13.9$ , female:  $52.6 \pm 12.9$ ). Overall, breast cancer (1,264 cases, relative frequency of 27.4%) was the most prevalent cancer; however the mean ages of diagnosis were not significantly different between 5-year time period divisions ( $p=0.290$ ). The most common cancer in men was esophageal cancer (26.3%). The lowest mean age was related to women diagnosed with breast cancer ( $48.5 \pm 11.8$ ) and men with non-Hodgkins lymphoma ( $48.4 \pm 17.8$ ). There were statistically significant differences between the mean age of men and women with gastric ( $p=0.003$ ) and esophageal cancers ( $p<0.001$ ). Male to female sex ratios in our study for bladder, lung and stomach cancers were 6.57, 2.60 and 2.50 respectively. **Conclusions:** The results showed that breast cancer tends to be found in younger female patients and bladder cancer appears more often in men. Screening in target population in addition to early diagnosis may reduce death and disability.

**Keywords:** Cancer - epidemiology - Iran - Mashhad - demographic survey

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### Introduction

Cancer is the second cause of death after cardiovascular diseases in developed countries. Studies done in the United States show that one out of every four deaths is due to cancer. (Siegel et al., 2011) Cancer is the fourth leading cause of death in developing countries and the third one in Iran (Emami Razavi et al., 2009, Mousavi et al., 2009). According to GLOBOCAN 2012, an estimated 14.1 million new cancer cases and 8.2 million cancer-related deaths occurred in 2012 (Ferlay et al., 2012)

Valid information in relation to the epidemiology of this disease is the first step for health care planning in each region. Demographic studies have led to a disease pattern by age, sex, racial, economic and cultural conditions in a region, thus specifies the target groups which need more attention from health care system. Thus the disability and economic costs imposed by the disease would be reduced by careful planning and screening. (Yaw et al., 2014).

These studies constitute an important part of studies on cancer and without such statistics; a proper assessment of the costs may not be estimated to provide more favorable conditions for the patients including required hospital beds, chemotherapy, radiotherapy, surgical facilities and specialists working in the field.

Since the pattern of age distribution of cancer depends on the regional conditions (environmental, physical and chemical), dietary habits, lifestyle and genetic factors, Despite the global statistics, lack of enough and reliable information for each region is recalls the need for necessity of more research on these issues. (Koladoozan et al., 2010).

We decided to review the demographic data of patients with 10 common non-skin cancers in the world and in Iran according to official statistics announced by globocan, 2012 (Bray et al., 2012) including lung, breast, colorectal, prostate, stomach, liver, cervix, esophagus, bladder cancers and non-Hodgkin's lymphoma (NHL) among

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patients referred to the Radiotherapy and Oncology Clinic from 1985 to 2012 in Mashhad. The aim of this study was to assess the relative frequency of the 10 above listed cancers in the studied target population and comparison in 5 year intervals between genders and also estimate the mean age, urban or rural percentage of each of the malignancies mentioned in this population.

## Materials and Methods

### Study subjects

This descriptive study was carried out to assess the demographic characteristics of patients with 10 common cancers worldwide referred to the Radiotherapy and Oncology Clinic in Mashhad 1985 to 2012. This clinic is the first private oncology center set up in the northeast of Iran and a large number of cancer patients have been referred to from other cities around Iran, especially from the North and East part. The data were obtained from patient's records using the checklist. We included all patients over 14 years with histopathologically confirmed with one of the 10 cancer types listed in the latest report of GLOBOCAN with the world's highest incidence in both sexes including lung, breast, colorectal, prostate, stomach, liver, cervix, esophagus and bladder cancers. The same information was carried out from Iran reports with NHL only added to Iran's records.

Demographic data including age, sex, and year of admission, residency (urban-rural), occupation and type of cancer based on anatomical classification were carefully obtained from patient's records. To compare the relative frequency and the mean age of patients at diagnosis, periods of studies were divided into 5 Timeframe as follows: before 1990, 1991-1995, 1996-2000, 2001-2005, 2006 and later.

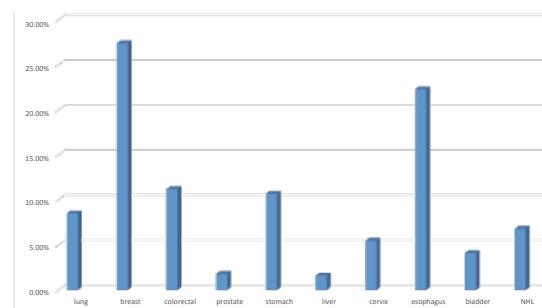
### Statistical analysis

Data analysis was conducted by the statistical software SPSS vs. 11.5 using the statistical test Mann Whitney and independent sample T test for two groups comparison and Kruskal-Wallis, ANOVA for more groups.  $p < 0.05$  was used as the criterion of statistical significance.

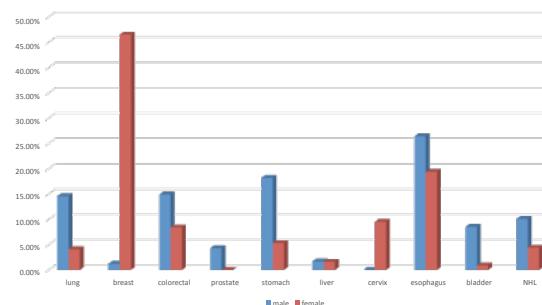
## Results

During the years 1985-2012, 10,000 patients with various malignancies were admitted to this center. Records of 4606 cases had our inclusion criteria. 42.1% were male

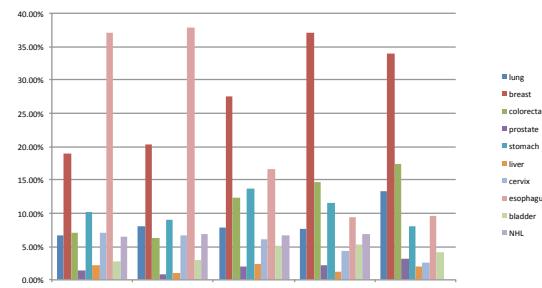
and the mean age of all patients was  $55.5 \pm 13.8$  (range 14-102 years, male:  $59.5 \pm 13.9$ , female:  $52.6 \pm 12.9$ ). Among these, 95.1% were urban and 4.90% were rural. The relative frequency of cancers in the studied population, respectively, were: breast cancer 27.4% (1264 cases), esophageal cancer 22.3% (1028 cases), colorectal 11.2% (514 cases), gastric cancer 10.7% (495 cases), lung cancer 8.50% (392 cases), NHL 6.80% (313 cases), cervical cancer 5.50% (252 cases), bladder cancer 4.10% (190 cases), prostate cancer 1.80% (83 cases), liver cancer 1.60% (75 cases) (Figure 1). Among men, the most



**Figure 1. The Relative Frequency of Each Malignancy in the Population**



**Figure 2. Cancer Population Distribution According to Sex**



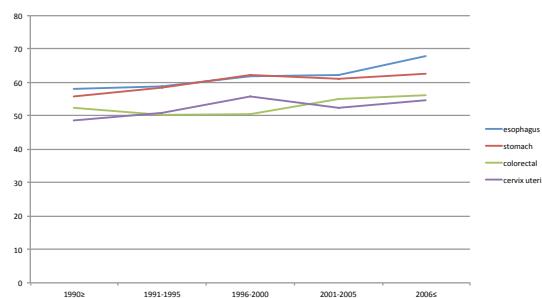
**Figure 3. The Ranking of 10 Type of Cancer at 5 Years Intervals**

**Table 1. Gender Distribution and The Mean age Distribution by Gender for Each Cancer**

Malignancies	Male (%)	Female (%)	Male/female ratio	Total mean age	Male mean age	Female mean age	value-p
Lung	72.4	27.6	2.6	60.4±12.8	61.2±12.5	58.4±13.6	0.067
Breast	1.9	98.1	0.02	48.7±11.9	58.9±11.4	48.5±11.8	≤0.001
Colorectal	56.4	43.6	1.29	53.0±13.8	52.6±14.3	53.5±13.1	0.479
Stomach	71.5	28.5	2.5	60.4±11.6	61.5±11.1	58.9±12.5	0.003
Prostate	100	0	-	68.0±6.63	-	-	-
Liver	44	56	0.78	57.8±12.5	57.9±14.2	57.7±11.2	0.939
Cervical	0	100	-	52.5±11.7	-	-	-
Esophageal	49.7	50.3	0.98	60.1±12.1	61.6±12.3	58.7±11.6	≤0.001
Bladder	86.8	13.2	6.57	66.9±11.5	67.3±11.4	64.2±12.5	0.396
Non-Hodgkin lymphoma	62.7	37.3	1.68	49.1±17.4	48.7±17.9	50.1±16.6	0.441

**Table 2. The Mean Age of Patients for Each Cancer Type in 5 year Intervals**

Malignancies	Time periods			P-value	
Lung	≥1990	1991-1995	1996-2000	2001-2005	≤2006
Breast	59.5±14.5	59.8±11.8	58.9±12.7	61.4±13.8	62.3±13.2
Colorectal	48.0±13.2	47.5±11.9	49.0±11.6	49.6±11.0	48.7±12.5
Stomach	52.3±14.4	50.2±14.4	50.5±13.8	54.8±12.3	56.1±14.1
Prostate	55.6±12.0	58.3±10.8	62.0±11.4	61.1±11.7	62.5±12.7
Liver	66.3±9.85	66.2±6.19	67.8±4.75	66.3±6.38	67.5±7.76
Cervical	51.4±7.23	58.2±11.6	61.6±9.5	54.5±18.8	55.2±13.6
Esophageal	48.5±11.6	50.9±11.4	55.7±11.3	52.5±12.1	54.5±12.8
Bladder	57.8±12.3	58.8±11.5	61.8±12.0	62.3±14.2	67.8±10.7
NHL	61.6±14.0	66.2±12.9	64.7±10.2	70.2±10.8	68.4±11.5
	43.0±16.0	47.7±17.3	48.1±18.3	51.5±16.5	53.9±17.1



**Figure 4. The Mean Age of Patients in Four Type of Cancer at 5 Years Intervals**

**Table 3. Geographical Distribution of People with Cancer**

	Urban (%)	Rural (%)
Lung	96.6	3.4
Breast	98.4	1.6
Colorectal	97.6	2.4
Stomach	90.7	9.3
Prostate	96.3	3.7
Liver	95.7	4.3
Cervix uteri	97.9	2.1
Esophageal	90.9	9.1
Bladder	95.5	4.5
NHL	93.8	6.2

frequent cancer was esophageal cancer with 509 cases (26.3%) and the lowest was breast cancer (24 cases, 1.20%). However in women, breast cancer by 1240 cases (46.5%) had the most frequency and bladder cancer by 25 cases (0.90%) was the lowest (Figure 2). This frequency was given in the whole study period and after time period divisions (5 years), some changes can be observed in the (Figure 3).

The gender distribution for each cancer can be observed in table 1. The majority of patients with prostate, bladder, lung, stomach, colorectal cancers and non-Hodgkin lymphoma were men, but the cases with cervix, breast, liver, esophageal cancers were most women.

Table 1 demonstrates the mean age for each cancer and the comparison between genders. There were significant differences between the mean age of men and women with gastric cancer ( $p=0.003$ ) and esophageal cancer ( $p<0.001$ ). The mean age of patients for each type of cancer at 5 years intervals using ANOVA test is shown in Table 2. There were significant differences in four cancers including esophagus, stomach, colorectal and cervix cancers (Figure 4). In terms of residence location (urban or rural), gastric cancer and esophageal cancer 9.10% and 9.30%

respectively, had the highest rural population (Table 3).

## Discussion

In this study breast cancer was the most common cancer among 10 evaluated cancers. However it was the most frequent cancer in women and in the second rank after esophageal cancer during 1985-1990 and 1991-1995 intervals. Breast cancer is the most common cancer in women worldwide (Bray et al., 2012) including Iran (Mousavi et al., 2009, Abachizadeh et al., 2012). In this study the mean age of women at the time of diagnosis was  $48.51\pm11.81$  years and there was no significant difference between 5 intervals of studies, and in the study of Hemminki the mean age of women with breast cancer was 46.3 years (Hemminki et al., 2011). In the study of Fallahzadeh indicated that the mean age at diagnosis was  $48.2\pm11.7$  year, similar to other Iranian study such as Afsharfard and Najafi (Afsharfard et al., 2013, Najafi et al., 2013, Fallahzadeh et al., 2014). The 20-year study of breast cancer in Tehran demonstrated a significant difference for the mean age (47.2, 48.8, 49.2 years) at time intervals respectively (1985-1995, 1996-2000 and 2001-2006) (Harirchi et al., 2010). In another study performed on five different provinces of Iran in 2000, the mean age at diagnosis was  $46\pm12$  years (Vostakolaei et al., 2012) and in the study of Hichem Bouguerra mean age of cases was  $50.9\pm11.9$  (Bouguerra et al., 2014). Breast cancer median age at the diagnosis was 46 years in 2004-2009 in ethnic disparity Iran study (Harirchi et al., 2010). The mean age of our patients was similar to other studies in Iran or other developing countries; however in comparison with developed countries was 10-15 years lower (Chouchane et al., 2013).

In this study, esophageal cancer was the most common cancer in male and second most common cancer in both sex and women. The mean age of patients with esophagus cancer was 60 years with statistically significant difference between genders, so that the men diagnosed with this malignancy were 3 years older than women. The mean age at diagnosis compared between study periods had increased significantly. Male to female sex ratio in our study was 0.98. Esophageal cancer is the eighth most common cancer in the world and the fourth in Iran in 2012 (Bray et al., 2012). This high frequency would be expected due to the location of Iran in world esophageal cancer belt (Kamangar et al., 2007). In this study it was the most common cancer before 1995 but the second rank between

the years 1996-2000 and in 2001-2005 and later was the forth rank. This is consistent with mentioned statistics indicating reduced incidence of cancer in the world and in Iran (Khademi et al., 2012). But in another study with kiadaliri about prevalence of esophageal cancer in Iran during 2003-2009 reports an increasing trend (Kiadaliri, 2014). However, it is noteworthy that our study population consisted of referred patients, and due to increasing medical centers in other provinces, reduced frequency of referred malignancy in the years 2000 onwards could be expected. The mean age of patients in the study of Mosavi was 70 years old and there was no difference in age between men and women in 2002- 2006 but Sex ratio (male to female) was 1.3 (Mosavi-Jarrahi et al., 2013). In a study of Mansour-Ghanaei the mean age of patients was 63 between 1996 to 2005 (Mansour-Ghanaei et al., 2013).

In our study colorectal cancer was the third most common cancer in general and in men and women. This is also the third most common cancer in the world and in Iran (Mousavi et al., 2009, Bray et al., 2012). two studies indicate an increase in the incidence of colorectal cancer (Moghimi-Dehkordi et al., 2008; Atrkar-Roushan et al., 2013). This increasing pattern has been noticed by Asian countries where the pattern of cancer incidence is similar to our country (Atrkar-Roushan et al., 2013).

The relative frequency of this malignancy in our study ranked fourth in the years before 2000 but after that ranked second after breast cancer. This change in frequency could be as well caused by the increasing incidence of this cancer in Asia and Iran due to changes in dietary habits and lifestyle (Bahrampour and Nikbakht, 2013). Mean age at diagnosis was 53 years that showed a rising trend between the studies periods divided by 5 years. There was no significant difference in age between men and women, and the male to female sex ratio was 1.3 which is similar to study of Ahmad Reza Baghestani and the study of Bello Arkilla Magaji (Baghestani et al., 2014, Magaji et al., 2014). In the studies of Safaei 2005-2009, published by Ministry of Health and the Cancer Registry, the mean age of patients was 53 years old with similar sex ratio to our study (Safaei et al., 2012). In the other study in Iran mean age at diagnosis time was greater than our study (Moradi et al., 2009, Heidarnia et al., 2013). In the study of Hajmanoochehri mean age of 57.7 for male and 56.6 for female was detected. (Hajmanoochehri et al., 2014).

Gastric cancer is the fifth most common cancer worldwide (Bray et al., 2012) and the fourth most frequent in our study population. According to the Cancer Registry reports in Iran, it is the first common cancer in men and the third in women (Mousavi et al., 2009). In our study, the mean age was 60 years. There was a significant difference in age between men and women and an increase in the mean age of the patients over time. This increase is similar to statistics cited in Mousavi's study, which examined published reports on gastric cancer in Iran and showed that mean age of patients increased from 53 to 65 years from prior 1990-2005. Male to female sex ratio obtained from our study was 2.5, which is similar to other studies in Iran (Mousavi and Somi 2009, Somi et al., 2014).

Lung cancer ranks in fifth among all cancers in our study, however, in the last period of time ascended to third

rank. This cancer is the most common cancer in the world and the seventh most common cancer in the Persian Gulf. (Bray et al., 2012, El-Basmy et al., 2013). The average age of lung cancer is 55-65 years (El-Basmy et al., 2013). In our study, the mean age was nearly 60 years old and there was an increasing trend in the studied period without significant difference between the sexes in the age of diagnosis. Male to female sex ratio was 2.6, similar to another study in Yazd (Mirtalebi and Zahir, 2012).

Other malignancies, Non Hodgkin lymphoma, cervix, bladder, prostate and liver cancers had a descending order of frequency in our study.

The relative frequency of cervical cancer is decreased but bladder cancer increased in different time intervals. Cervical cancer is the seventh most common cancer in the world (Bray et al., 2012). It is the most common gynecologic cancer and the forth malignancy in women (Bray et al., 2012). Incidences of this cancer tend to reflect differences in the penetration of screening programs and the highest incidences tend to occur in population with low screening (Reis et al., 2012). Nearly 41.3 percent of cancers seen in Indian females are accounted by cancer of breast and cervix. The estimates of cancer of cervix incidence would rise from 96,156 cases (0.096 million) to 148,813 (0.148 million) cases during 2011-2026 (Dsouza et al., 2013). In this study, similar to the world's studies, the frequency of cervical cancer has reduced during time intervals (Arab et al., 2014) and it is the seventh most common cancer both in our study and in the world (Bray et al., 2012). The mean age in our population was  $52.4 \pm 11.7$  which is in the range of other studies in Iran (Karimi Zarchi et al., 2011). According to the GLOBOCAN 2012 report, Bladder cancer is the ninth most common cancer in the world (Bray et al., 2012) and is the fifth most common cancer in Iran, having a second rank of incidence among Iranian men. In this study we found it as number 8th among most common cancers and also the frequency of bladder cancer was increased during the intervals of our study. This pattern of increase in the incidence could be found in Iranian men by reviewing the reports from past years (Yavari et al., 2009), some reason could be due to risk factors such as cigarette smoking, opium consumption, history of excessive analgesic use and hair dye usage (Basiri et al., 2014). Mean age of bladder cancer worldwide is above 70 years (median 73) and the incidence increases with age (Karbakhsh et al., 2013). In this study the mean age at diagnosis was  $66.8 \pm 11.5$  which was higher than other studies in Iran (Yavari et al., 2009, Karbakhsh et al., 2013). There is no difference between men and women according to the age of diagnosis in our study. Bladder cancer is three times more common in male than female (Salehi et al., 2011). In this study male to female ratio was 6.57. Other studies from different parts of Iran also reported this ratio higher than the world's ratio, however, not as high as our results (Yavari et al., 2009, Salehi et al., 2011, Karbakhsh et al., 2013). This difference might more be due to smoking prevalence and exposure to occupational hazards among men (Ahmadi et al., 2012)

The mean age of prostate cancer in our study was 68 and it had no significant changes during this study. The results are in accordance with previous reports from Iran

(Basiri et al., 2014, Zahir et al., 2014)

Conclusion: our data resulted in better understanding of the epidemiology of various malignancies in the north east of Iran, for example, breast cancer tends to be found in younger patients. The reasons for this earlier age at onset require further investigation through environmental observation. Relative frequency of esophageal cancer is due to location of Iran on world's esophageal cancer belt, and bladder cancer appears more often in men, so cancer control program in this region should be considered these differences and consequently provides a useful guide for screening in target population and early diagnosis to reduce death or disabilities.

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