

RESEARCH COMMUNICATION

Cancer Occurrence in Semnan Province, Iran: Results of a Population-Based Cancer Registry

Mehdi Babaei, Shahrokh Mousavi, Mojtaba Malek, Gafar Tosi, Zolfaghari Masoumeh, Navid Danaei, Gandaghi Gafar

Abstract

Introduction: suitable information of different cancers in special geographic areas can help define medical programs for treatment and screening of high-risk groups.

Aims and Methods: The provincial health authority reported a high mortality rate from upper GI cancer in the center of Iran. A comprehensive search was undertaken to survey and register all cases of cancer during a 5-year (1998-2002) period among the indigenous population of Semnan Province. Diagnosis of cancer was based on histopathology, clinical or radiological findings, and death certificates.

Results: A total of 1732 patients with cancers (mean age $59.41\% \pm 19.08\%$ years) were found during the study. Of these, 936 (54.86%) were in males. Crude rates were 124.8/100'000 and 112.1/100,000 for males and females, respectively. Age-standardized ratios (ASRs) for all cancers in males and females were 156/100'000 and 136/100,000 person-year, respectively. Gastric cancer was the most common tumor with an incidence rate of 19.7 per 100,000 people (ASR=27.5). In upper gastrointestinal cancers, gastric cancer was the most common (47.17%), followed by colon malignancies (8.1%, 9.5 per 100,000 populations), esophagus (6.8%, 7.9 per 100,000 populations), liver (2.4%, and 2.8 per 100,000 populations). In women, breast, uterine and ovary, stomach and skin were the most common cancers. In the child population the most common tumors were of the brain, acute lymphocytic leukemia, and bone.

Conclusion: Gastric cancer alone constitutes one-sixth of all cancers in Semnan, with the highest ASR incidence rate reported from Iran up to now.

Key Words: Cancer incidence - Semnan province - Iran

Asian Pacific J Cancer Prev, 6, 159-164

Introduction

In recent years the causes of human morbidity and mortality have been changed from infectious to non communicable diseases and cancer has been known as the third major cause of mortality in Iran after the cardiovascular disease and accidents (Naghavi, 2000). So cancer is an important priority of health system researches.

In recent decades different groups have studied the prevalence of cancer in different part of Iran. One of these first groups was established in 1969 by joint collaboration of the institute of public health research (IPHR) of Tehran University of Medical Sciences (TUMS) and the International Academy for Cancer Research (IARC) (Mahboubi et al., 1973; Habibi, 1965; Haghghi and Najar, 1971). Similar studies have been conducted in Ardabil (Northwest) and Kerman provinces (south of Iran) by Digestive Disorders Research Center (DDRC) of TUMS (Sadjadi et al., 2003). According to these studies results there

is high incidence of esophageal cancer in Iran and our country is the most common site of esophageal cancer in the world (Kemet and Mahboubi, 1972; Aramesh and Salmasizadeh, 1975). In a unreported study of Semnan province, gastric cancer was found to be the most common cause of mortality due to the cancers.

The prevalence of esophageal cancer in western countries has remained stable (Honsen et al., 1997) but the incidence of non-cardiac gastric cancer is reducing (Botter et al., 2000). Although the incidence of mortality and morbidity in a country can review the prevalence of cancer but, it can not show the incidence of various cancers in different geographic area. Cancer registry system is able to show the exact incidence of cancers in an especial geographic region which is necessary for health programs planning by Ministry of Health, Treatment and Medical Education.

The aim of the present study was to investigate the incidence of various cancers in Semnan province based on cancer registry system data.

Department of Internal Medicine, Semnan University of Medical Sciences, 17 Shahrivar Bolvar, Fatemieh Hospital, Semnan, Iran Fax: +98 231 3341449 E-mail: amo_babaei@yahoo.com

Material and Methods

Geographic Location and Demography

Semnan province has been located in the center of Iran, south of Alburz Mountains and north of Great Salt Desert (Dasht-e-Kavir) of Iran. Its area is about 80,000 km² (5% of total Iran width) (Figure 1).

North of Semnan is hilly with the altitude of 2000- 3500m above sea level. Its center and south part has altitude of 800 - 1000m from sea level and most of its cities and population have been located near mountains.

From northern border it is neighbor of Golestan province with highest incidence of esophageal cancer in the world. The weather of southern part is warm and dries with many salt and plaster mines while its northern part has a moderate to cold climate. Approximately 90% of population is of Aryan Caucasoid rice ancestry.

The population in this area is about 293000 according to census of 1999. The physician-to-patient ratio is 1/830; there are 8 hospitals with 750 beds, 20 clinical diagnostic laboratories, 3 pathology laboratories and 14 diagnostic radiology clinics.

Data Collection

The central office of the Semnan Cancer Registry has been located in Fatemieh hospital. This center has been approved by ethics committee of Semnan University of Medical Sciences. The data was collected from hospital records, radiology and pathology clinics, laboratories, central death registry office of Semnan, vice chancellor for health and rural health centers. Also the data was gathered from mortality-morbidity registry center and in rural area from the behvarzes (auxiliary health-care workers in health houses who are responsible for public health care and the health

census of each village). Copies of patients documents were obtained.

Some patients may refer to other medical centers out of the province such as Tehran. We tried to collect the information about these cases from private offices.

Presentation of Data: Questionnaire

The 5-year data (from 1998-2002) was gathered in central office and coded using the international calcification for disease for oncology (ICD-O) (Fritz et al., 2000).

The information about individual characteristic and demography, death cause, cancer type and residential place in recent 10 years was completed in a questionnaire and arranged alphabetically. The repeated cases were omitted. All data were assessed by two groups in two sessions. Cases were divided in 10 years age groups.

Statistical Analysis

The data entered the computer using SPSS (Chicago, IL) software version 11.5 and MS Excel (Microsoft, Redmond, WA) software with Persian fonts.

We calculated person-years of the at risk population using each year method. Crude incidence rate of cancers were calculated in various age groups and both sexes in 100.000 populations. World standardized rate (ASR) per 100.000 person- years was calculated using the direct method of standardization to the world population (Jensen et al., 1991). ASR is the cancer incidence rate between two groups in the same time or in different time in various geographic sites. This type of statistics limits the evaluation of difference between younger and older population. We assessed the study population using world standard population (Jensen et al., 1991).

Results

In a 5-year period from 1998-2002, 1805 cases were registered in Semnan province. Complete and exact information was present in 1732 cases (95.8%) that were registered as new cases of cancer. Of the registered cases 936 (54%) were males and 796 (46%) were females. Mean age of patients at first diagnosis was 59.41 ± 19.08 yr. Mean age of men and women at disease diagnosis were 62.04 ± 18.69 yr and 56.20 ± 19.07 , respectively.

Tables 1 and 2 show the principle cancer sites, 10-year age specific incidence rates, mean annual incidence, crude rate of cancers and ASR for men and women. Cancer diagnosis was based on histopathology in 85% of cases, death registry in 4% and other clinical and paraclinical methods in 11% of cases.

According to ASR, 5 top cancers of men were stomach (39.96), esophagus (11.), colon (11.62), prostate (10.1), and lung (9.19), respectively. Also five most common cancers in women were: breast (21.3), uterus and ovary (17), stomach (14.8), colon (10.52), esophagus (8.8). Overall incidence of new cancer cases were 153 / 100000 per year as well as 136/100000 for women and 156/100000 for men.



Figure 1: Map of Iran and Semnan

Table 2. Age-specific Incidence Rates, Average Annual Crude Incidence Rates and ASR in Males

Site	ASR	Total Crude	+60	50-59	40-49	30-39	20-29	10-19	0-9
Stomach	36.9	28.3	247	85	31.2	6	0.75	0.5	0.62
Skin	10.2	12.4	64	15.5	0	7	2.25	2	0.62
Breasts	2.29	1.2	4.7	0	7.8	7	0	0	0
Colon	11.42	10.6	62.4	34.5	25	7	0.75	1	0
Esophagus	11.70	9	70.2	29.3	9.3	2	0	0	0
Lung	9.19	7.6	60.8	16	3.1	4	0.75	0.5	0
Brain	7	5.7	25	21.4	3.1	4	5.25	0.5	2.5
Bladder	7.16	6.1	54.6	10.2	0	1	0.75	0	0
Prostate	10.11	8.2	89	2.6	0	0	0	0.5	0
Non Hodgkin's Lymphoma	5.39	4.4	25	5.2	11	2	3	0	0.62
Pancreas	1.58	3.5	160	8	1.6	0	0	0	0
Liver	5.83	2.93	29	13.5	4.7	3	1.5	1.5	0
Thyroid	2.22	1.5	8	2.6	6.25	1	1.5	0	0
Hodgkin's Lymphoma	2.1	1.5	7	6.6	3.6	2	0	0.6	0
Oral Cavity	1.95	1.5	6.6	5.3	3.3	2.1	0.75	0	0
Bone	2.62	2.2	7.8	2.6	3.3	2.1	1.5	3	0
Small Intestine	3.2	2.5	15.5	2.6	1.6	2.1	0.75	0	3.2
Larynx	3.03	2.25	21	8	0	0	0	0	0
Kidney	2.27	1.75	17	2.5	1.5	0	0	0	0
Bronchus	3.2	2	203	5.3	0	0	0	0	0
Gallbladder	0.36	0.2	3.3	0	0	0	0	0	0
Lymphoid Leukemia	1.8	1.1	9.3	0	1.5	1	0.75	1.2	0.65
Myeloid Leukemia	2.26	1.6	8.3	2.5	1.6	3.1	1.5	1	0.65
Multiple Myeloma	0.78	0.53	5	2.6	0	0	0	0	0
Testis	0.58	0.57	0	0	1.6	2.1	0.86	0	0
Others	2.45	2.4	6.6	7.5	3.3	3.1	3.8	0	0.64

Table 1. Age-specific Incidence Rates, Average Annual Crude Incidence Rates and ASR in Females

Site	ASR	Total Crude	+60	50-59	40-49	30-39	20-29	10-19	0-9
Breasts	21.30	20.1	63.5	71.3	60	1	2.25	0.5	0.62
Ovary & Uterus	17	14.7	21.2	32	58	21	10.5	2	1.25
Stomach	14.8	10.8	94.5	21.1	16.3	0	3	0	0
Skin	7.46	9.4	37.5	27	0	1	3	0.5	0.62
Colorectal	10.52	8.4	42.7	56.6	3.2	2	0.75	0	0
Esophagus	8.8	7	44	27	8.4	4	0	0.5	0
Lungs	4.57	3.6	29.3	8	3.3	2	0	0	0
Brain	6.26	5.2	19.3	14.5	6.3	4	0	2	0.6
Non Hodgkin's Lymphoma	4.47	4.1	11.4	12.5	10	0	2.25	3	0
Bladder	3	2.6	18	5	3.2	1	0.75	0	0
Pancreas	2.83	2.23	23	0	1.6	0	0	0.6	0
Liver	3.53	2.65	25	4.9	1.7	0	0.86	0	0
Thyroid	4.47	3.71	10	9.9	9.8	4.2	4.4	0.57	0
Oral cavity	3.43	2.79	18.3	7.5	0	0	2.6	1.1	0.6
Bone	2.76	2.23	8	10	3.3	1	0.86	1.1	0.6
Hodgkin's Lymphoma	2.43	1.25	8.1	7.5	0	0	0.86	0	0
Larynx	1.09	0.83	3.25	2.46	3.27	1	0	0	0
Kidney	0.71	0.55	6.5	0	0	0	0	0	0
Bronchus	0.17	0.13	1.6	0	0	0	0	0	0
Gallbladder	2.13	1.53	11.4	9.8	0	0	0	0	0
Lymphoid Leukemia	1.33	1.1	4.9	2.5	0	0	0	0	2.66
Myeloid Leukemia	1.73	1.39	11	1.6	0	3.27	0	0	0
Multiple Myeloma	1.13	0.83	6.5	2.46	1.6	0	0	0	0
Cervix	1.08	0.83	1.6	7.4	0	2.1	0	0	0
Others	1.73	1.53	5	0	5	1	0.83	1.1	0.6

Discussion

Various epidemiologic studies have been performed about cancers in developed and developing countries which their results can be found in the report of IARC as “Globocan” report (Ferlay et al., 2000; Forlay and Bary, 2002). In this study we report the prevalence of different cancers in a region in the center of Iran. Considering the results and ASR reported rate and comparing with other studies our results are different.

Overall prevalence of cancer in ASR study was 156 in men and 136 in women. Some results of these studies in different continents are as follow: Polinzi, French: 209 in women and 186 in men (Gleize et al., 2000); Karachi: Pakistan, 132.4 in men and 133 in women (Bhurgrri et al., 2002); Ardabil, 132 in men and 96 in women (Sadjadi et al., 2003), overall the estimated value in Iran is 116.8 (Forlay and Bary, 2002), Gambia 61 in men and 55 in women (Bah et al., 2001).

The first information about cancer incidence in Iran was reported in 1970 from the study of Caspian Sea area in 1968-1972. In that study ASR was 71.9 for men and 45 for women and esophageal cancer was the most common cancer, but in our study prevalence of gastric cancer has increased and esophageal cancer decreased.

In our study ASR for all cancers is similar to other Asian and European countries. In the present study, gastric cancer was the most common cancer. ASR for gastric cancer in our study was 40 in men, and in other countries was a follow: Italy 44, French 25, Scotland 28, Island 34, Holland 26, Switzerland 20.7, Denmark 5.8 (Botter et al., 2000) and also it has been reported from south of Iran as follow: Fars province 5.5, Khuzestan 0.3, Kerman 10, Ardabil 49.1 (Sadjadi et al., 2003). These results show similar incidence of gastric cancer in these area with Europe high risk area such as Italy and Island.

In first cancer registry study in Iran, 30 years ago, in Caspian Sea area esophageal cancer was reported as the most

common cancer in that area (Mahboubi et al., 1973) and in the last one in Ardabil (northwest of Iran) gastric cancer was the most common cancer (Sadjadi et al., 2003).

In our study gastrointestinal (GI) cancers only included 35.7% of all cancers which of them 16.7% are gastric cancers, 8.1% colon cancers, 6.7% esophageal cancers, 1.7% small intestine cancers and 2.4% liver cancers that have changed significantly from the first study (30 years ago). This change may be due to modification of data collection method or larger sample size.

In the first study (Mahboubi et al., 1973) the histopathological diagnosis has been performed in only 27% of cases but in our study histopathological diagnosis was made in 85% of cases.

Semnan province has been located in south of Turkmensahra area which is one of the most common area of esophageal cancer in the world. In our study also the highest prevalence of esophageal cancer has been reported in northern part of Semnan, near Turkmensahra area. In present study lung cancer, the most common cancer in most countries was in 8th order level.

High prevalence of gastric cancer may be due to Helicobacter pylori infection, genetic factors, diet and environmental factors. Despite of Ardabil study which the prevalence of *H. pylori* was reported 90% (Mikaeli et al., 2000), it was 48% (Moradi and Rashidy-Pour, 2000) in Semnan in all ages.

In Ardabil study 50% of gastric cancers were cardial cancer, but in our study the most common site of gastric cancer was antrum. Also the mean patients’ weight was not high in this study. Considering these facts, *H. pylori* and obesity can not be counted as major predisposing factors of gastric cancer in this area. Considering geographic location, Semnan province is similar to areas with high prevalence of gastric cancer such as Chile, Costa Rica and Japan (Wallerstein, 2001). Semnan also has been located near the silent volcano and charcoal mines. The studies have shown that its drinking water has a lot of minerals and salts and is

Table 3. Comparison between Semnan Cancer Registry and Globocan 2002

Globocan 2002				Semnan Cancer Registry			
ASR	Female Site	ASR	Male Site	ASR	Female Site	ASR	Male Site
17.1	Breasts	26.1	Stomach	21.3	Breasts	39.96	Stomach
14.4	Esophagus	17.6	Esophagus	17	Ovary & Uterus	11.7	Esophagus
11.1	Stomach	8.3	Colon	14.8	Stomach	11.62	Colon
6.5	Colon	8	Bladder	10.52	Colon	10.20	Skin
4.4	Uterus	7.2	Lung	8.8	Esophagus	10.11	Prostate
3.3	Leukemia	5.4	Prostate	5.46	Skin	9.19	Lung
2.6	Brain	4.8	Leukemia	6.26	Brain	7.16	Bladder
2.3	Ovary	4.2	Non-Hodgkin's Lymphoma	4.57	lung	7	Brain
2.3	Non-Hodgkin's Lymphoma	3.7	Brain	4.47	Non-Hodgkin's Lymphoma	5.8	Liver
2.2	Lung	3.1	Larynx	4.47	Thyroid	5.39	Non-Hodgkin's Lymphoma

very hard water. Concentration of calcium bicarbonate is 300-1600 mg/lit in the water and concentration of chloride, sulfate and bicarbonate is very high. Concentration of Iodine and flour is low and below permissible measures. Concentration of heavy metals such as copper, cadmium and lead is below permissible levels also (Nouri, 1989). There is doubt about the relation between these factors and gastric cancer. The role of diet as an effective factor should not be forgotten.

One of the diets of this area population is eating house-made, native pickles which are routine. GI cancers included 35% of all cancers which is a warning sign for health care providers to investigate the predisposing factors of GI cancers and also for people and physician to use screening methods for early diagnosis of GI cancers.

Low incidence of lung cancers shows that cigarette smoking can not be a risk factor of gastric cancer, because if the smoking is a risk factor then the prevalence of lung cancer should be reported high. Low prevalence of lung cancer is also reported in Ardabil study. In the study of Union European countries except cutaneous cancers, the most common cancers in men were as follow: lung 21%, large intestine 13%, prostate 12%, urinary bladder 7% and gastric cancer 7% and in women was as follow: breast cancer 28%, colorectal cancer 15%, lung 6%, uterus 5% and gastric cancer 5%. Also prevalence of cancers in west Europe was more than east (Bray et al., 2002). In an estimated statistics by Globocan 2002 about prevalent tumors of Iran, it has been compared with this study results in Table- 3.

Our results is similar to Globocan 2002 considering that Globocan data is based on hospital reports and estimation but our results are based on normal population study and it is more valid.

According to IARC report overall incidence of all tumors in more than 65 years was 2158/100000 in men and 1192/100000 in women which is 7 times and 4 times of tumor incidence in below 65 year, respectively (Hansen, 1998). Cancer incidence in men and women is similar before 50 year old and after that it increases more in men than women and it reaches to 884 in men and 544 in women. In other words cancer incidence is more in older men than older women.

According to IARC study annual incidence of cancer in men are as follow: prostate cancer 451/100,000, lung cancer 449/100,000, colon cancer, 176/100,000, and in women with more than 65 year old was as follow: breast cancer 548/100,000, colon cancer 133/100,000, and lung cancer 118/100,000 which contains 48% of all tumors of old people. In our study these results were as follow in men: gastric cancer 247/100,000, prostate cancer 89, esophageal cancer 70.2, and in women; gastric cancer 94.5, breast cancer 63.5 and esophageal cancer 44. Incidence of lung and colorectal cancers was lower than other region.

As common cancers according to our results are the cancers that early diagnosis of them is possible using screening methods such as colonoscopy, esophagogastroduodenoscopy, mammography and others,

routine request of these paraclinical studies may be recommendable in more than 50 year old people.

In this study we report the incidence rate of cancers in a central part of Iran. The study has high validity considering accuracy and homogeneity of population, documents and the project team and the results is useful for future health care and research planning for prevention and control of cancers in this area.

Information about the incidence of tumors is necessary for health care planning. By having complete information about the tumors in each area we can evaluate the number of required hospital beds or patients who need chemotherapy or radiotherapy or oncology department.

Also by having the information about incidence rate we can identify the mortality and morbidity rate and by magnification of one or more especial tumors we can describe it as a problem in a region.

Acknowledgments

We thank from Ministry of health, medical students, and local health staff in survey teams who contributed to this survey.

References

- Aramesh B, Salmasizadeh S (1975). Epidemiology and Laboratory study of malignant tumors in Caspian. *Iran Health J*, **4**, 1-6.
- Bah E, Parkin DM, Hall AJ, Jack AD (2001). Cancer in the Gambia 1988-97. *Br J Cancer*, **84**, 1207-14.
- Bhurgri Y, Bhurgri A, Hassan SH (2002). cancer pattern in Karachi Division (1998-1999). *J Pak Med Assoc Jan*, **52**, 244-46.
- Botter Weck AM, Schouten Lj, Volasics A (2000). Trends in incidence of adenocarcinoma of the esophageal and gastric cardia in ten European countries. *Int J of Epidemiology*, **29**, 645-54.
- Bray F, Sankila R, Ferlar J, Parkin DM (2002). Estimates of cancer incidence and mortality in Europe in 1995. *Eur J cancer*, **38**, 99-166.
- Ferlay J, Bray B, Pisani P, Parkin DM (2000). Globocan 2000 Cancer incidence, mortality and prevalence world wide. Lyon, France IARC.
- Forlay J, Bary B (2002). Globocan 2002 Cancer incidence, mortality and prevalence world wide, www.dep.iarc.fr/Globocan, 2002 htm
- Fritz PA, Percy C, Jack A, et al (2000). International classification of diseases for oncology, 3rd ed. Geneva: WHO.
- Gleize L, Laudon F, Sunly (2000). Cancer registry of French Polynesia. *Eur J Epidemiology*, **18**, 661-7.
- Habibi A (1965). Cancer in Iran. A Survey of the most common cancer. *J Nat Cancer Inst*, **34**, 553-69.
- Haghighi P, Najari K (1971). Gastrointestinal Cancer in Iran. *J Chronic Dis*, **24**, 625-33.
- Hansen J (1998). Common cancer in the elderly. *Drug Aging*, **13**, 467-78
- Honsen S, Wing JN, Geircksky KE (1997). Esophageal and gastric carcinoma in Norway 1985-1992: Incidence time trends variability according to morphological subtypes and organ sub-sites. *Int J Cancer*, **71**, 340-44.

- Jensen OM, Parkin DM, McLennan CS (1991). Cancer registration: Principles and Methods. Lyon, France IARC Scientific publication No.95.
- Kemet J, Mahboubi E (1972). Esophageal cancer in the Caspian littoral of Iran. *Science*, **175**, 846-53.
- Mahboubi E, Kemet J, Cook PJ, Day NE, Ghadirian P (1973). Esophageal cancer Studies in the Caspian Littoral of Iran: The Caspian Cancer registry. *Br J cancer*, **28**, 197-214.
- Mikaeli J, Malekzadeh R, Ziad-Alizadeh B (2000). Prevalence of Helicobacter Pylori in two Iranian provinces with high and low incidence of gastric carcinoma. *Arch Iranian Med*, **3**, 6-9.
- Moradi A, Rashidy-Pour A (2000). Seroepidemiology of Helicobacter Pylori infection in Semnan. *Journal of Semnan University of Medical Sciences Summer*, **1**, 53-7.
- Naghavi M (2000). Death Report from 10 provinces in Iran, 1st ed. Tehran: Ministry of Health.
- Nouri A (1989). Quality of drinking water in Semnan. Tehran: Tehran University press.
- Sadjadi A, Malekzadeh R, Derakhshan MH (2003). Cancer occurrence in Ardebil: Results of a population-based cancer registry from Iran. *Int J cancer*, **107**, 113-8.
- Wallerstein C (2001). Costa Rica tackles high rate of stomach cancer. *BMJ*, **323**, 1270.