RESEARCH COMMUNICATION

An Epidemiological Analysis of Cancer Data in an Iranian Hospital during the Last Three Decades

Parvin Yavari[1]*, B Sadrolhefazi[2] , MA Mohagheghi [3], H Madani[2], A Mosavizadeh[2], A Nahvijou[3], Y Mehrabi [4], MA Pourhseingholi[4]

Abstract

Cancer is the third leading cause of death in Iranian population. Descriptive epidemiology provides a better understanding of the etiology of cancer and the development strategies. The objective of this study was to collect analysis of data and discuss certain epidemiologic features of neoplasm using data from hospital. Records of 14,540 patients diagnosed for cancer during the time period 1973-2003, who were referred to the department of radiation oncology were studied. The tumors were coded and classified according to the International Classification of Diseases 10th revision and ICD-O. SPSS version 10 was used for statistical analysis. In this study the frequency distribution of cancer patients were computed by age of diagnosis, gender, and anatomical sites. There were 8,178 male patients (56%) and 6,365 females (44%) with a male female ratio of 1.29. Mean age was 44.5±21.6 with a median of 47 years. The mean age of diagnosis for females (43.8.±19.7) was significantly lower than that of males (45.0±23.1) (P<0.05). The ten most frequent cancer sites among patients were breast (13.6%), brain &CNS (13.6%), skin(13.5%), haemapoitic system(9.7%), lymphoid (7.1%), esophagus (7.1%), colon & rectum (4%), male genital organs (1.3%), bladder (1.3%), lung (1.2%), and stomach (1%). These accounted for 81% of all cases. It was found that 41% of women's cancers were in the breast, female genital organs compared to 7.3%in male genital organs and breast. All tumors except the breast, female genital organs, thyroid, gallbladder and kidney cancers, were more frequent in males compared to women. The frequency of patients with cancers increased with age in both sexes. Overall 53% of cases were between 40-63 years of age. For those aged 54 and below the male to female ratio was 0.99, while after this age the ratio rose to 1.61. About 16.6% of tumors occurred in children aged 15 years or younger. More than four fifths (81%) of patients with cancer of haematopoeitic system were under age of 15 years. In conclusion, the results of this study present an important epidemiological understanding of patients with tumors. It emphasizes that gender plays an important role in the frequency of primary tumors, and how much the sex ratio varies with some types of tumors. We also noted that certain tumor types show a prediction for certain decades of life in our series.

Key Words: Cancer - descriptive epidemiology - hospital registry

Introduction

Cancer is a health problem in all countries, although its priority rating varies. Cancer ranks as the first or second cause of death in persons' aged 15-74 in many countries. In those developing countries where its priority is rated low, there is evidence to indicate that with improvements in the control of communicable diseases and in environmental sanitation and increase in life expectancy and average age of the population, the proportion of deaths attributable to cancer has been increasing and will increase in the future. It is therefore important that developing countries pay increasing attention to their present cancer problems and prepare themselves to meet the challenge of the future through setting up appropriate cancer control programmes and through purposeful research (Maclennan et al., 1978).

The necessity for a nation to have a National Cancer Registry is unquestioned; however, to have such a registry has been beyond the resources of most countries in the developing regions of the word. Because of this , most countries have to obtain their cancer data from a hospital based registry, or at best a regional based registry (Mortazavi et al., 2000).

The registry analysis will respond to the need for a more comprehensive epidemiological support for health policy planning in the country. The registry analyses and interprets such data provides information on characteristics of specific cancers in population and such information is the primary resources not only for

[1]Department of Health & Community Medicine and Behavioral Science Research Center [2]Department of Oncology, Shohada Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, [3]The Cancer Institute Research Centre, Imam Khomeini Medical Centre, Tehran University of Medical Sciences,[4]Research Center for Gastroentrology & Liver Disease*For Correspondence: Fax: 22439939 Email: parvinyavari@yahoo.com

Table1. Mean, Median, Standard Deviation, and Quartiles of age (years) for Cancer Cases at Various Sites

Anatomical sites	ICD-O	Number	Mean±sd	P25	Median	P75	95%CI
Lip and Oral Cavity	00-06	248	56.3±16.8	46	59	67	(54.2, 58.4)
Parotid and Salivary Gland	07-08	103	44.4±17.6	30	47	58	(41.0, 47.9)
Pharynx and Tonsil	09-13	260	44.7±16.8	35	45	58	(42.7, 46.8)
Esophagus	15	1035	56.7±12.5	49	58	65	(56.0, 57.5)
Stomach	16	474	56.4±13.7	48	58	66	(55.2, 57.7)
Colon and Rectum	18-21	647	50.7±15.7	40	52	64	(49.5, 51.9)
Liver	22	62	42.5±24.3	21	46	65	(36.4, 48.7)
Gallbladder	23-24	37	57.8±10.9	46	60	66	(54.1, 61.4)
Pancreas	25	36	54.6±15.1	47	56	64	(49.5, 59.8)
Larynx	32	379	58.9±10.9	51	60	66	(57.8, 60.1)
Lung	33-34	559	57.5±14.7	50	60	68	(56.3, 58.8)
Hemato.sys.	42	1405	12.4±15.2	4	7	11	(11.6, 13.2)
Skin	44	1965	58.1±15.0	50	60	70	(57.5, 58.8)
Breast	50	1984	48.6±11.8	40	47	56	(48.1, 49.1)
Cervix Uteri	53	383	50.5±11.5	42	50	58	(49.3, 51.7)
Corpus Uteri	54	88	56.8±12.8	51	57	65	(54.1, 59.6)
Ovary	56	198	42.4±16.2	30	45	54	(40.2, 44.7)
Kidney	64-65	32	51.5±11.7	42	52	57	(47.3, 55.8)
Bladder	67	597	61.9±12.8	56	63	70	(60.9, 62.9)
Brain and CNS	70-72	1974	30.5±19.4	13	28	45	(29.7, 31.4)
Thyroid	73	127	51.4±17.4	39	53	65	(48.4, 54.5)
Adrenal	74	18	24.8±26.1	4	13	36	(11.8, 37.7)
Other Endocrine glands	75	280	35.5±15.7	23	34	47	(33.6, 37.3)
Lymph node	77	1050	31.7±21.2	12	29	50	(30.4, 33.0)
Male genital organs	60-62	599	54.1±20.3	36	62	70	(52.5, 55.8)
Total	00-80	14540	44.5±21.6	27	47	60	(44.1, 44.8)

epidemiological research on cancer determinants but also for planning ad evaluating health services for prevention, diagnosis and treatment of the diseases. The purpose of a hospital-based cancer registry is to serve the needs of the hospital administration, the hospital's cancer program, and above all, the individual patient (Jensen et al, 1991).

For more than 30 years, radiation oncology department of the Shohada hospital was one of the major referral divisions for patients with cancers requiring treatment. Today, radiation oncology department of the Shohada hospital remains one of the few reference centers for the treatment of patients with cancer in Iran. The main objective of this this study is to collect, analysis of data from the radiation oncology department of the Shohada hospital between 1973 and 2003 and classify information on all cancer cases in order to produce statistics on the occurrence of cancer in a defined population and to provide a framework for assessing and controlling the impact of cancer on the community.

Materials and Methods

Records of 14,540 patients diagnosed for cancer during the time period 1973-2003, who were referred to the department of Radiation Oncology, at Shohada hospital, Shahid Beheshti University of Medical Sciences in Tehran were studied. The patient's referral pattern was very diverse. Patients were referred from private and public hospitals. The case definition for this study is any malignant tumors diagnosed for the first time in a time period 1973 to 2003. Those included in this study were all patients with histologically confirmed primary malignant tumors. The data were extracted from patient's files available in department, and entered into a computer database. Tumors were coded and classified according to the International Classification of Diseases for Oncology (ICD -O), 3rd revision (Fritz et al, 2000). SPSS version 10 was used for statistical analysis. The frequency distribution of cancer patients were computed and cross-tabulated with epidemiologically important variables such as age, age at diagnosis, gender, place of residence, marital status, occupation, date of diagnosis, anatomical site, histology types, last date known to be alive, and stage of disease. For age and cancer, mean, standard deviation, median, quartiles and 95% confidence intervals were presented. The findings were compared with other studies in Iran and other countries and interpretation of data were emphasized.

Patients were counted once for every primary tumor. Metastatic tumors were entered under their primary site, or as tumors with unknown primary site (C80.9 in the ICD-10) if no primary tumor was located. Cases of disseminated disease where the extensive search for a primary was not deemed important for patient treatment were all included as unknown primary tumors.

Results

During 30 year of study period (1973-2003) a total number of 14540 cancer cases were referred and treated at Radiation–Oncology department. An average of 485 cases was treated each year at Radiation Oncology department. Of these cases, 8174 (56%) were male and 6345(44%) were female with a male to female ratio of 1.29(table 1). The overall ratio of male to female cases vary significantly (P<0.05). Mean and standard deviation

Table2. Mean, Median, Standard Deviation and Quartiles of Age (years) for Cancer Cases at Various sites in Males and Females

Anatomical sites	ICD-O	Number	Mean±sd	P25*	Median	P75*	95%CI*
Male							
Lip and Oral Cavity	00-06	151	56.6±14.6	46	57	67	(54.2, 58.9)
Parotid and Salivary Gland	07-08	55	48.1±18.5	34	53	62	(43.1, 53.1)
Pharynx and Tonsil	09-13	174	45.7±17.1	36	47	60	(43.1, 48.3)
Esophagus	15	597	57.9±12.6	50	60	66	(56.9, 58.9)
Stomach	16	352	57.1±13.2	50	60	66	(55.7, 58.5)
Colon and Rectum	18-21	385	51.0±16.5	38	52	64	(49.3, 52.6)
Liver	22	36	45.6±24.6	26	52	68	(37.2, 53.9)
Gallbladder	23-24	10	56.6±10.7	45	58	65	(48.9, 64.3)
Pancreas	25	22	58.6±11.7	50	58	65	(53.5, 63.8)
Larynx	32	329	59.7±10.3	52	60	67	(58.6, 60.9)
Lung	33-34	450	58.8±13.8	51	61	69	(57.5, 60.1)
Hemato.sys.	42	884	13.0±16.1	5	7	12	(11.9, 14.1)
Skin	44	1355	58.8±14.9	50	60	70	(57.9, 59.5)
Breast	50	66	55.3±13.0	46	56	64	(52.0, 58.5)
Bladder	67	509	62.0±12.7	56	63	70	(60.9, 63.1)
Brain and CNS	70-72	1221	31.6±19.5	14	30	46	(30.5, 32.7)
Thyroid	73	48	56.4±16.8	46	61	69	(51.5, 61.3)
Adrenal	74	13	30.4±28.2	6	22	51	(13.3, 47.4)
Other Endocrine glands	75	173	35.8±15.9	24	34	48	(33.4, 38.2)
Lymph node	77	745	31.6±21.2	11	30	49	(30.1, 33.1)
Male genital organs	60-62	599	54.1±20.3	36	62	70	(52.5, 55.8)
Total	00-80	8174	45.0±23.1	25	50	63	(44.4, 45.5)
Female							
Lip and Oral Cavity	00-06	96	56.4±19.3	46	60	70	(52.5, 60.3)
Parotid and Salivary Gland	07-08	48	40.3±15.7**	28	41	53	(35.7, 44.8)
Pharynx and Tonsil	09-13	85	42.9±15.9	33	44	53	(39.5, 46.3)
Esophagus	15	437	55.1±12.1**	45	55	65	(54.0, 56.3)
Stomach	16	121	54.4±14.9	45	56	65	(51.7, 57.1)
Colon and Rectum	18-21	259	50.1±14.5	40	50	62	(48.3, 51.9)
Liver	22	26	38.4±23.9	19	40	52	(28.7, 48.0)
Gallbladder	23-24	27	58.2±11.1	47	60	67	(53.8, 62.7)
Pancreas	25	14	48.4±18.1**	29	55	63	(37.9, 58.9)
Larynx	32	50	53.6±13.3**	46	55	61	(49.8, 57.4)
Lung	33-34	109	52.3±16.8**	44	55	65	(49.1, 55.5)
Hemato.Sys.	42	521	11.3±13.7**	4	7	11	(10.1, 12.5)
Skin	44	607	56.9±15.2**	48	60	67	(55.6, 58.1)
Breast	50	1915	48.4±11.7**	40	47	56	(47.8, 48.9)
Cervix Uteri	53	381	50.6±11.3	42	50	58	(49.4, 51.7)
Corpus Uteri	54	88	56.8±12.8	51	57	65	(54.1, 59.6)
Ovary	56	197	42.5±16.2	30	45	54	(40.2, 44.7)
Kidney	64-65	31	50.8±11.2	42	52	56	(46.7, 54.9)
Bladder	67	88	61.4±13.5	54	64	71	(58.5, 64.3)
Brain and CNS	70-72	752	28.7±19.1**	11	25	43	(27.3, 30.1)
Thyroid	73	79	48.4±17.1**	36	50	64	(44.5, 52.2)
Adrenal	74	5	10.2±11.7	2	6	20	(0.0, 24.7)
Other Endocrine glands	75	106	34.8±15.3	22	34	46	(31.8, 37.7)
Lymph node	77	303	32.0±21.5	13	27	51	(29.5, 34.4)
Total	00-80	6345	43.8±19.7	30	45	57	(43.3, 44.3)

*P25= 25th percentile; P75=75th percentile; CI=Confidence Interval **P<0.05 compared to males

of the patients' age was 44.5±21.6 with median of 47 years. The mean age of diagnosis for females (43.8.±.19.7) was significantly lower than that of males (45.0±23.1); P<0.05. As can be seen from figure 1, for the age 35-50 year age group, the percentage for women was higher than for males whereas this trend changed noticeably afterwards. The ten most frequent cancer sites among patients were breast (13.6%), brain &CNS (13.6%), skin (13.5%), haemapoitic sys.(9.7%), lymphoid (7.1%), esophagus (7.1%), colon & rectum (4%), male genital organ (1.3%) bladder (1.3%) lung (1.2%) and stomach (1%). These account for 81% of all cases (table 1).

Table 2 shows the distribution of cases registered by cancer sites, age and gender. There were 6345 cancer cases in females, with the ten most common cancers were being: breast (30.1%), brain & CNS (11.9%), Skin (9.6%), haemapoitic. system (8.2%), esophagus (6.9%), cervix uteri (6.0%), lymph node (4.8%), colon & rectum (4.1%), ovary (3.1%), and finally stomach (1.9%). In males, a total of 8174 cancer cases were observed with the ten most

Table3. Distribution of Cancer sites for Patients <15 Years Old

Anatomical sites	ICD-OC	Number	Percent
Lip and Oral Cavity	00-06	7	0.31
Parotid and Salivary Gland	07-08	4	0.18
Pharynx and Tonsil	09-13	19	0.85
Esophagus	15	2	0.09
Stomach	16	5	0.22
Colon and Rectum	18-21	5	0.22
Liver	22	11	0.49
Larynx	32	1	0.04
Lung	33-34	7	0.31
Hemato.Sys.	42	1175	52.53
Skin	44	20	0.89
Breast	50	2	0.09
Cervix Uteri	53	1	0.04
Corpus Uteri	54	1	0.04
Ovary	56	15	0.67
Bladder	67	8	0.36
Brain and CNS	70-72	578	25.84
Thyroid	73	3	0.13
Adrenal	74	10	0.45
Other Endocrine glands	75	32	1.43
Lymph node	77	309	13.81
Male genital organs	60-62	22	0.98
Total	00-80	2237	100.0

frequent cancers being: skin (16.6%), Brain & CNS (14.9%), haemapoitic. sys (10.8%), lymph node (9.1%), male genital organ (7.3%), esophagus (7.3%) bladder (6.2%), lung (5.5%), colon & rectum (4.5%), and stomach (4.3%) (table 3).

It was found that 41% of women's cancers were in the breast, and female genital organs compared to 7.3% in male genital organs and breast. Table 2 shows the distribution of primary malignant tumors by anatomical sites and gender. It shows that except for the breast, female genital organs, thyroid, gallbladder and kidney cancers, for all the tumors were more frequent in males compared to women.

The male to female ratio for the cases was 1.29. This ratio was 6.6 for larynx, 5.8 for bladder, 4.1 for lung, 2.9 for stomach, 2.6 for adrenal, 2.5 for lymph nodes, 2.0 for pharynx & tonsil, 1.7 for haemapoitic. Sys, 1.6 for brain & cns, lip &oral cavity and pancreas each, 1.5 for colon and rectum, 1.4 for esophagus, 1.3 for liver, 1.2 for parotid and salivary gland. The lowest ratios were .04 and .03 for breast and kidney retrospectively.

The frequency of patients with cancers increases with age in both sexes. Overall 53% of cases were between 40-63 years of age. For those aged 54 and below the male to female ratio was 0.99, while after this age the ratio rose to 1.61.

About 68% of lip & oral cavity, 84% of esophagus, 80% of stomach, 77% of colon & rectum, 97% of gallbladder, 87% of larynx, 80% of lung, 75% of skin, 82% of kidney, 82% of bladder cancer patients were between 40-74 years of age. And 84% of breast and 78% of female genital organs cancer patients were between 30-64 years of age. About 77% of thyroid cancer patients were between 35 -74 years of age and 50% of brain & cns

cancer patients were below age 0-29 years of age. Overall, most female patients (59%) were in the age group 35-64 years compared to most male patients (63%) with 50-74 years of age.

About 16.6% of tumors occurred in children of age 15 years old and younger. More than two third (81%) of patients with cancer of haematopitic system. were under age of 15 years. Out of 2237 children with cancer less than 15 years of age, neoplasms of haematopitic (53%), brain & CNS (26.1%), and lymph nodes (14%) were the commonest with total of 93.1 %(table 3).

Table 1 show that patients with Hemato.sys were the youngest with a mean age of 12.4±15.2. Half of these patients were 7 years or younger. The mean age of female patients was even less than that of male (P<0.05) (table 2). The average age of male patients with cancer of the lip & oral cavity, esophagus, pancreas, larynx, lung, hemato.sys., skin, brain & CNS and thyroid was significantly higher than those of females(P<0.05)(table 2). No significant difference between the mean ages of two sexes was seen in other cancers sites. Men with cancer of the bladder organs had the highest mean of age (62.0±12.7), and among women, patients with cancer of the bladder with a mean age of 61.4±13.5 were the oldest.

Discussion

A series of 14540 pathologically verified tumors were analyzed for relative frequency, and anatomical sites as well as the distribution of age and sex. These results were compared to other studies in Iran, countries of the region and in West.

An analysis of total series has resulted in the general conclusion that there is a preponderance of males over females (56% to 44%), which correspondons to results previously mentioned in literatures(Mortazavi et al.1999, Sadjadi et al., 2003, and Mehrabi et al. 2004). Male predominance was found in a selected group of tumors cases. According to the present study, for most tumors, male predominance is noted except for breast and kidney. Mean age at diagnosis was significantly lower for females than males. This finding is comparable to other studies in Iran and Westernized countries (Mortazavi et al.1999, Mehrabi et al. 2004, and Adib et al. 1998).

The results showed that , cancers of breast , brain & CNS , skin, haemato.sys., lymphoid, digestive organs, bladder, lung and stomach account for more than two third of all patients with cancer. This is comparable to other studies in Iran (Mortazavi et al.1999, Mehrabi et al. 2004). At present study, Tumour of brain & CNS account for 13.6% of all admitted cases with cancers and are the second most common cancer both in males and females among patients, with a male to female ratio of 1.6. Other studies in Iran demonstrated that it was 5th most common in males and the 7th in females (Mortazavi et al.1999). The rate in different parts of the word varies (Adib et al. 1998). The relative frequency of brain & cns tumors is higher compared to other studies in Iran (Mortazavi et al.1999, Mehrabi et al. 2004, Mehrazin et al.2006) and also it is higher compared to Western countries (Greenwald

et al 1983). This may be due to the pattern of referral and the specialized treatment facilities in oncology radiotherapy center.

Breast cancer was the first most common cancer among female patients accounting for one third of all cancers (30.1%). The relative frequency is higher compared to other studies in Iran (Mortazavi et al., 1999, Iranian Annual of National Registration Report 2004) and also it is higher compared to countries of the region and western countries. The frequency rate in countries of the region such as Pakistan, Iraq, and Egypt is 19-23% and the rate in the West is about 25-28% (Parkin, 2001). Breast cancer is now a problem and has a changing age pattern. For example, in this study 35.1% of breast cancers occurred in young premenopausal (30-44) and 51% in women of 45-64 years age group. This is comparable to other study in Iran (Mehrabi et al., 2004). This cancer is amenable to prevention and or early detection. The relatively high rate of breast cancer could be related to the westernization of the population, with accompanying changes in diet and lifestyle. A concentrated program like screening, regular breast examination and mammography is needed for early diagnosis and treatment which is a key measure in reducing mortality. Our results emphasize the importance of the issue of age and diagnosis of breast cancer.

According to our present study, Haematopoitic cancers was ranked fourth in our series with a male to female ration of 1.5, while it ranked first in other studies in Iran (Mortazavi et al., 1999; Mehrabi et al., 2004). The discrepancy partly attributed to treatment availability and patient referral in the two hospitals. Haematopoitic and lymphoid cancers were ranked first and second among children below 15 years of age with a relative frequency of 53% and 26% retrospectively of all admitted children cases. This is comparable to other studies in Iran (Salabian, 1990; Mortazavi et al., 1999, Mohagheghi et al., 2002). The relative frequency is higher compared to the western countries (Parkin, 2001). This may be explained by the etiologic roles of the environment such as chemical, radiation and pollutant hazards,, infections, and also due to the young population of country with 39.5% of under 14 years. With half of the population being under the age of 20 years, a large number of neoplasms were observed in the 0-14 years of age group (Statistical Center of Iran 2002).

Skin cancer is relatively common in Iran, ranked third among patients with a mean age of 58.1 and relative frequency of 13.5%. This is comparable to that reported by other studies in Iran (Iranian Annual of National Cancer Registration Report 2004). It is more prevalent in males showing a sex ratio of 2.2. The rate is below 1% in the region and in Asia countries as compared to the very high rate (30%) in Australia and very low rate (0.2%) in Japan (Parkin et al., 2001).

The results showed that esophageal cancer frequency was 6.9% in females and 7.3% in males with a male to female ratio of 1.4. Mean ages for esophageal cancer were 57.9 and 55.1 for men and women, respectively. Almost 84% of the cases were occurred in the age group 40-74. Comparing the relative frequency with those of other

studies in Iran, the rate is lower (Mortazavi et al., 1999, Mehrabi et al., 2004). The sex ratio in this series is much lower than that observed in Europe or North America. Esophageal cancer ranked as the fifth most frequent cancers in Iranian Annual of National Cancer Registration Report, 2004. The rate of esophageal cancer in Countries of the region is lower. The rate in different parts of the world varies significantly (Chokunonga et al., 2000). The tumor generally associated with poor nutrition and socio-economic status.

In conclusion, the results of this study present an important epidemiological understanding of patients with tumors. It emphasize that gender plays an important role in the frequency of primary tumors, and it emphasize , how much the ratio of the two sexes varies in some types of tumors. We noted that certain tumor types show a prediction for the certain decades of life in our series. The frequency and distribution of some types of tumors were different than those reported by other studies from the westernized and regional countries.

Cases recorded at the hospital are mainly those amenable to therapeutic intervention and are likely to occur among younger patients. This potential bias could lead to underestimation of the average age at which cancer is detected. The relative frequencies and epidemiological characteristics of cancer cases recorded at Radiotherapy Oncology department are also affected by availability of one or the other treatment procedures. By comparing our findings to those available for the years 1972-96 from Jorjani hospital, this comparison showed a large difference in the relative frequencies of sites and types of cancer cases. For example, brain & CNS was ranked second in this study among men and women, while it ranked fifth in the male and sixth among female in Jorjani series. This discrepancy may be partly attributed to the detection of cancer and active surgical interventions.

Some cancers in this series-cancer of the skin among males, cancer of the breast among females-are amenable to prevention and / or early detection. Prevention and early detection of theses frequent cancers should become essential goal for public health policymakers. The results present here provide encouragement for further prospective epidemiological studies.

Acknowledgments

References

Chokunonga E, Levy L M , Bassett M T, et al (2000). Cancer incidence in the African population of Harare, Zimbabwe: Second results from the cancer registry 1993-1995. *Int JCancer*, **85**, 54-59.

Fritz A, Percy C, Jack A, et al (2000). International Classification of Diseases for Oncology. 3rd Edition. Geneva: World Health Organization.

Greenwald ED, Greenwald ES (1983). Cancer Epidemiology. Medical Examination Publishing Co. INC, NY.

Iranian Annual of National Cancer Registration Report 2004, Islamic Republic of Iran, Ministry of Health & Medical Education, Health Deputy Center for Disease Control, Non-communicable Deputy , Cancer Control Office.

Jenson O M, Parkin D M, Maclennan R, et al (1991). Cancer registration principle and methods, LARC Scientific publication No. 95 Lyon.

Mehrabi Y, Yavari P, Abadi A (2004). A study of cancer patterns among inpatients of public hospitals in Iran. *Asian Pacific J of Cancer Prevention*, **5**, 387-92.

Mehrazin M, Rahmat H, Yavari P (2006). Epidemiology of intracranial tumors in Iran, 1973-2003. *Asian Pacific J of Cancer Prevention*, **7**, 2006, 283-88.

Mortazavi SH, Shahrad B, Shahidi M (1999). Twenty five years experience in cancer in Iran 1972-96. An epidemio logical study of cancer patients referred to the department of radiation oncology, Jorjani medical center, Report.

Sadjadi A, Nouraei M, Mohagheghi M, et al (2005). Cancer occurrence in Iran in 2002; an international perspective. *Asian Pacific J of Cancer Prevention*, **6**, 659-63.

Maclennan R, Muir C, Steinitz R, et al (1978). Cancer registration and its techniques, WHO, International Agency for Research on Cancer, Lyon.