

RESEARCH COMMUNICATION

Institution-based Cancer Incidence in a Local Population in Pakistan: Nine Year Data Analysis

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Abstract

At present no national level of cancer registry program exists in Pakistan and the data available from different sources, necessary for incidence, prevalence, morbidity/mortality, and etiological assessment of cancer and cancer control programs, are from hospital or institutional databases. Karachi Institute of Radiotherapy and Nuclear Medicine (KIRAN) is a comprehensive healthcare facility for diagnosis, treatment and research of all cancers. This is a retrospective analysis of the cancer patients of both genders of all age groups to determine frequencies of different cancers presented to this Institute from 1st January 2000 to 31 December 2008. A total of 16,351 cancer patients were registered at KIRAN during the nine year period. Male cancers accounted for 48.1% and female cancers 51.8%. Some 558 (3.4%) were in children (0-15 years). The mean ages at presentation for males and females were 50 ± 9.6 and 47 ± 7.4 years respectively. In males the five most frequent malignancies were head and neck (32.6%), lung (15%), gastrointestinal tract (GIT) (6.9%), lymphoma (6.1%), and bone and soft tissue (4.9%). In females breast cancer was the most common cancer accounting for 38.2% followed by head & neck (15.1%), cervical (5.5%), ovarian (4.9%) and GIT cancer (4.9%) respectively. Cancer prevalence in different age groups with respect to gender and the epidemiologies of most common cancers with reference to our cultural and environmental factors and dietary habits are also discussed. Overall cancer incidence in nine years in this tertiary care cancer institution showed that head and neck cancers in males and breast cancers in females are most common, at rates almost highest in Asia. Mean age and male to female ratio in all other cancers are essentially comparable to other developing countries.

Key Words: Pakistan - cancer incidence - hospital-based data

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Introduction

Cancer is becoming a serious health threat in many Asian countries and it has become the leading cause of death in Asian Pacific countries (Park et al., 2008). In year 2000, there were over 3 million new cancer cases and over 2 million cancer deaths in Asia and projections suggest that the number of new cancer cases in Asia will increase to 7.1 million by year 2020 if existing prevention and management strategies remain unchanged (Mackay et al., 2006).

Pakistan, the seventh-most populous country in the world, is a republic in south central Asia. It shares international geographical boundaries and cultural similarities with India in the east and southeast, Iran and Afghanistan on the west and northwest and China and Soviet Central Asian Republics in the north. Political instability and economy downfall ruins our institutions in general and health department in particular. Lack of national policies, which helps to combat epidemics, diseases, and other disaster, is our big tragedy. Pakistan, like other developing countries of the region, faces a

double burden of diseases with a significant incidence of cancers and a rising trend in risk factors' profile and incidence itself (Ferlay et al., 2004; Bhurgri et al., 2000). The precise incidence, mortality rates, number of new cancer cases and number of deaths annually for Pakistan is not known.

There are no comprehensive database/registries available regarding any disease including cancer in Pakistan and the only data available is hospital based. In the first 5 decades published data of a few sporadic Institution based registries, and the Pakistan Medical Research Council (PMRC) provided the country with its only cancer database. The Karachi Cancer Registry (KCR) was established in 1995. The registry was developed with the perspective of measuring the cancer burden through a sample population of the country (Bhurgri et al., 2006). Relative frequencies of different cancers have been reported sporadically by some radiotherapy centers (Jaffarey and Zaidi, 1987).

We are presenting our institution-based data on cancer incidence to determine relative frequencies of different cancers in this region. Although this is an institution based

data having some constraints but is the major source, which can provide essential clinical, administrative and educational information on cancer frequencies and other demographic data in the absence of any population based cancer registry in the country.

In KIRAN more than 30% patients were from outside Karachi including cancer patients from interior Sindh and Balochistan. The epidemiology of most common cancers will also be discussed.

Materials and Methods

This is a retrospective analysis of the cancer patients of both genders of all age groups to determine frequencies of different cancers presented to KIRAN Hospital from 1st Jan. 2000 to 31 Dec. 2008. This is the first report since KIRAN has started its oncological services in 1999. Initially the data was collected manually and within six months all the data was transferred on oracle database network designed for this purpose. The diagnosis and staging was according to international protocols and International classification of Disease-oncology.

KIRAN (Karachi Institute of Radiotherapy and Nuclear Medicine) is a comprehensive healthcare facility for diagnosis, treatment and research of malignant disorders. It has been built with the objective to adopt latest research methodologies for the management of cancer.

All major oncology diagnostic and treatment facilities including Radiation Oncology, Chemotherapy, Brachytherapy, Nuclear Medicine, Radiology, Molecular Endocrinology and comprehensive laboratory setup are available at KIRAN. Equipment like linear accelerators, computerized SPECT gamma cameras, Cobalt-60 teletherapy, simulators, treatment planning system,

dosimetry system, treadmill stress machines, laboratory systems and digital X-ray machines have been acquired and the centre is functioning since October, 1999.

Specific Performa of patient registry using local area network for radiation oncology information of KIRAN for Database buildup & analysis were used. Demographic data which include age, sex, and duration of symptoms and diagnosis of cancer based on histology (Biopsy reports, CT/MRI) or other diagnostic reports confirmed by oncologist were filled on first visit of the patients on two different patient counters of KIRAN and updated thereafter.

Results

A total of 16,351 cancer patients were registered at KIRAN during the nine year period from 1st Jan. 2000 to 31 Dec. 2008. Male cancers accounted for 48.1% and female cancers 51.8% of the total cases. Out of 16,351 cases, 558 (3.4%) were in children (age group 0-15 years). The mean age at presentation for males and females was 50±9.6 and 47±7.4 years respectively (Table 1).

In males the five most frequent malignancies were head and neck (32.6%), lung (15%), GIT (6.93%), lymphoma (6.14%), and bone & soft tissue (4.94%) (Table 1). In females breast cancer was the most common cancer accounting for 38.2% followed by head & neck (15.12%), cervical (5.54%), ovarian (4.9%) and GIT cancer (4.87%) respectively (Table 1).

Some of the cancers are important due to high rate in one gender like lung cancer (85% in males), urinary bladder cancer (78% in males), and brain cancer (64.7% in males). Breast cancer (99.0% in females) and gynecological cancers (cervical, ovarian and uterus

Table 1. Age-specific Cancer Incidences in KIRAN, Karachi (2000-2008)

Type	Total	Males (%)	ASR	Females (%)	ASR	0-15	16-30	31-45	46-60	61-75	>75
Head & Neck	3,852	2,568 (66.6)	32.6	1,284 (33.0)	15.12	56	277	1,032	1,462	851	171
Breast	3,275	32 (0.97)	0.40	3,243 (99.0)	38.2	4	302	1,346	1,185	401	38
GIT	960	546 (56.8)	6.93	414 (43.1)	4.87	4	71	237	362	246	38
Lung	936	95 (84.9)	10.1	141 (15.0)	1.66	2	18	94	354	409	57
Lymphoma	694	484 (69.7)	6.14	210 (30.2)	2.47	76	162	177	167	91	19
Bone/soft tissue	681	389 (57.1)	4.94	292 (42.8)	3.43	106	185	155	141	79	15
Brain	564	365 (64.7)	4.63	199 (35.2)	2.34	79	116	158	142	64	4
Cervical	471	0 (0.0)	0.00	471 (100)	5.54	1	12	164	193	91	9
Ovarian	422	0 (0.0)	0.00	422 (100)	4.97	6	68	141	160	44	3
Urinary bladder	394	306 (77.6)	3.88	88 (22.3)	1.03	1	8	50	151	142	42
Rectum/anus	347	235 (67.7)	2.98	112 (32.2)	1.31	9	79	99	115	40	5
Prostate	331	331 (100)	4.20	0 (0.0)	0.00	0	1	8	89	178	55
Hematological	284	201 (70.7)	2.55	83 (29.2)	0.97	93	60	59	39	26	6
Skin	269	171 (63.5)	2.17	98 (36.4)	1.15	5	28	52	94	65	25
Liver	264	168 (63.6)	2.13	96 (36.3)	1.13	0	10	53	111	78	12
Gall Bladder	264	55 (20.8)	0.69	205 (77.6)	2.41	0	5	63	121	64	10
Uterus	212	0 (0.0)	0.00	212 (100)	2.49	0	9	49	109	42	3
Colon	207	130 (62.8)	1.65	77 (37.1)	0.90	3	36	65	76	23	4
Thyroid	155	71 (45.8)	0.90	84 (54.1)	0.98	3	22	33	56	39	2
Renal carcinoma	153	96 (62.0)	1.21	57 (37.2)	0.67	15	9	39	54	34	3
Testicular	124	124 (100)	1.57	0 (0.0)	0.00	3	60	50	8	3	0
Eye	84	37 (44.0)	0.47	47 (55.9)	0.55	32	2	17	26	6	1
Others	1,408	767 (54.4)	9.74	645 (45.8)	7.59	60	178	349	482	289	49
All types	16,351	7871 (48.1)	100	8480 (51.8)	99.89	558	1718	4,490	5,697	3,305	571

ASR, age-standardized rate/100,000

cancers in females besides gall bladder cancer are highest (77.6% in females). Similarly, higher rates of hematological cancers were recorded in children (32% in age group 0-15 years).

Overall, 82.5 % of all cancers are among 31-75 years of age (35% are among 46-60 years, 27.4% 31-45 years and 20.2% are 61-75 years of age group) (Table 1). Similarly, 98.7% of breast cancers are in the age range of 16-75 years (80% are among 31-60 years) (Table 1). Similarly 87% of head and neck cancers are among 31-75 years of age (37% in 46-60 years and only 1.4% in 0-15 years age) (Table 1).

More than 70% of gynecological (cervical and ovarian) cancers are among 31-60 years of age and more than 80% of prostate cancers are among 46-75 years of age.

Discussion

Cancer data from one comprehensive tertiary care cancer institute is presented. It is possible that the number and percentage of different cancers may vary from other institutions and/or registries. It is also important to consider the way of data presentation in cancer registry and institutions and the angle, which is highlighted. Some variations in terminologies and type of cancer registered are different e.g. head and neck cancer instead of oral cavity cancer although both are used in registries as well as in hospital databases, similarly GIT cancers in which we have included both stomach and esophagus instead of counting them individually. Another major difference is that population based incidence rates usually calculated in terms of age standardize rates while it is not compulsory for hospital based incidence rate.

According to Karachi cancer registry (KCR) reports in the 1995-1997 data, the most common malignancies in terms of age-standardized rates in males were lung, oral cavity, urinary bladder and larynx. The cancers in females were breast, oral cavity and ovary. The data 1998 to 2002 showed a rising incidence for lung, larynx and urinary bladder in males and breast, esophagus and cervix in females (Bhurgri et al., 2006).

In KIRAN the most frequent malignancy recorded in males are head and neck cancers, which are 32.62% of the total male cancers (66.6% males) (Table 1). Similarly it is second most frequent cancer reported in females also 15.12% (33.3% females) (Table 1). Although it is reported second in KCR in both genders with similar rates (Bhurgri et al., 2006), it was also projected to be increasing in some other reports (Bhurgri et al., 2003; Bhurgri, 2005). The apparent reason for this exponential increase is the increasing use of tobacco and areca nut in Karachi. The major risk factors of oral cancer in Pakistan are smoking, areca nut, betel quid or paan and tobacco chewing, naswar, paan masala, gutka and poor nutrition (Bhurgri et al., 2006). A survey in Karachi indicated that 36% of the males and 21% females in Karachi chew paan or pan with tobacco. The age specific rates show a gradual rise to a maximum in the 7th decade in both sexes (Bhurgri et al., 2003; Bhurgri, 2005).

Breast cancer was the most common cancer in females accounting for 38.2% of the total female cancers in

KIRAN. Breast cancer was also reported to be highest in KCR (Bhurgri et al., 2006) and in some other reports from all over the country (Aziz et al. 2003). It is the highest incidence reported from any Asian country, except Jews in Israel (Parkin et al, 1993; Bhurgri et al., 2000). This is the most frequent cancer of women in Karachi, accounting for one-third of the cancers in the females.

Cervical and endometrial cancers ranks third (5.54% of the female cancers) which is also rated third most frequent malignancy in females by KCR and replaces cancer of the ovary in this position in the 1995-1997 data (Bhurgri et al., 2006) and comparatively lower than India and USA (Aziz et al. 2003).

Ovarian cancer is the fourth most common cancer observed with a median age of 51 years, the KCR (Bhurgri et al., 2000) has shown ovarian cancer as third most common malignancy after oral cavity cancer.

The reason for the relatively high rates of the cancers of the breast and the ovary in Pakistan are not known. Life style and reproductive factors may influence the incidence of breast and ovarian cancer, but the specific factors have not been identified. It is also possible that genetic factors such as mutations in the breast and ovarian cancer susceptibility genes BRCA1 and BRCA2 may contribute to a significant proportion of breast and ovarian cancer susceptibility. Pakistan has one of the highest rates of consanguinity in the world (Hashmi, 1997). The overall frequency of consanguineous marriages is 60-76% in Pakistan (Hashmi, 1997). Inbreeding is known to increase the risk of diseases caused by homozygosity of deleterious recessive genes. Parental consanguinity has been implicated in 60% of mortality and severe morbidity in Pakistani children born in Britain, and autosomal recessive disorders affect 3.7% of all Pakistani children (Powell et al., 1995). An excess of childhood cancers was also reported among children of consanguineous marriages in Britain (Powell, et al., 1995). There is little information on the possible role that recessive genes play in adult cancers. One study from Pakistan has described an association between consanguinity and risk of breast cancer (Shami et al., 1989) The incidence of reproductive age breast cancer is the highest reported globally (Bhurgri et al., 2006). Reproductive factors cannot be considered major risk factors, as early marriages, multiple births and prolonged breast-feeding are the norm. Early menarche, late menopause and thus the prolonged effect of reproductive hormones could be the other possible risk factors along with dietary factors and obesity. A family history of breast cancer is noted in approximately 3% of the cases registered. The predominant histological type is ductal cell carcinoma. A pronounced increase in the incidence of breast cancer has been observed in the last 5 years.

Lung cancers are 10.1% of male cancers and ranked as second most common malignancy in males at KIRAN while in females it is only 1.66%. According to KCR Lung cancer remains the leading malignancy amongst males in Karachi South. The ASR is moderately high for males, which is a nine times higher risk as compared with females in Karachi. This ratio is the highest in the world (Bhurgri et al., 2000). The major risk factor for lung cancer i.e.

tobacco smoking is practiced by 36% of the males and 9% of the females in Karachi. The age specific rates show a gradual rise from the 4th to 6th decade with a sharp ascent in the 7th decade. According to more than one hospital based data lung cancer is now steadily increasing and we expect it to be the number one cause of cancer in the next decade as tobacco abuse is rising in younger population (Aziz et al. 2003).

GI cancers, which includes esophagus and stomach ranks 3rd and 5th in both genders (6.93% in males and 4.87% in females). According to KCR the ASR of cancer esophagus, predominantly squamous cell carcinoma was seen to be marginally higher in the females. The male: female ratio remains equal, whereas most other world regions show a greater risk in males. The age specific rates show a gradual rise to a maximum in the 7th decade, in both sexes (Bhurgri et al., 2003; 2004; Alidina et al., 2004a; 2004b).

Lymphoma ranks fourth in male cancers (6.14%) while in females it was only 2.47% of the total cancers in KIRAN. The incidence of lymphoma is increasing largely contributed by non-Hodgkin's lymphoma. Higher incidence of non Hodgkin's lymphoma (>15%) was also reported in hospital data from Punjab and linked it with the indiscriminate use of pesticides (organophosphates). A 19% increase in the males and a 23% increase in females of Karachi have been reported during 1995 to 2002 (Bhurgri et al., 2005).

In conclusion retrospective analysis of cancer at our institution suggests a slightly different pattern from Karachi cancer registry (cancer data from Karachi South) and almost similar to that reported from some other institutions (Jinnah hospital, Lahore AFIP, Rawalpindi and some Radiotherapy centers of Pakistan Atomic Energy Commission) (Aziz et al. 2003). In developing countries like ours where reliable cancer estimates are not available, estimates have to rely upon cancer frequency data from institutions. However in the absence of population based registries, where standardized incidences and mortality figures are not available, studies like ours may provide useful information that can be utilized for health planning in future research.

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