Hospital-Based Cancer Profile at the Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan

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ABSTRACT

Objective: To determine a frequency distribution of the type and clinical profile of cancer cases registered at the Shaukat Khanum Memorial Cancer Hospital and Research Centre (SKMCH & RC).

Study Design: A retrospective, observational study.

Place and Duration of Study: The SKMCH and RC, Lahore, from December 1994 to December 2012.

Methodology: The time period taken into consideration for the three most common diagnoses was December 1994 - December 2012. Summaries were obtained for gender, age-group, and cancer type on: (i) all age-groups, both genders combined; (ii) adults (> 18 years); (iii) adult males (> 18 years); (iv) adult females (> 18 years); and (v) children (≤ 18 years). For a subset of cases registered between January 2004 to December 31, 2012 (9 years), summaries on cancers, age, addiction, family history, disease stage, and grade were obtained for the above groups. Statistical Package for Social Sciences, version 19, was used to analyze the data.

Results: The most common malignancies, for the 18-year time period, among adults, were those of breast (11,848/ 49,765, 23.81%), lip and oral cavity (3,291/49,765, 6.61%), and liver and intrahepatic bile ducts (2,836/49,765, 5.70%).

Conclusion: Hospital-based results obtained from various oncology hospital and departments, can be considered as an effective way forward in getting a preview of cancer burden in the region.

Key Words: Hospital-based. Cancer registration. Malignancies.

INTRODUCTION

The hospital-based cancer registry at the Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan, has been working since the Hospital started functioning on December 29, 1994 and is being handled by the unit called the Cancer Registry and Clinical Data Management (CRCDM).[1] Patients are triaged initially, as per hospital policy, and those accepted for treatment are registered at the Hospital. Following this, information relevant to the patients and diseases is abstracted from the records of the patients, diseases/conditions coded by the CRCDM staff, and results collated to generate summaries of cases every year.[1] The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), is being used to code both the cancerous and non-cancerous diseases.[2] Effective 2004, neoplasms are being coded using another coding scheme called the International Classification of Diseases for Oncology, Third Edition (ICD-O-3).[3] Planning, screening and prevention of preventable malignancies require a knowledge of the burden of disease at various level. SKMCH & RC has become a leading referral and tertiary care centre for cancer cases, in the country.

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The purpose of this study was to determine the distribution of cancer cases treated at SKMCH & RC, report the details related to the top three malignancies, and make a comparison with what has been reported elsewhere in the country.

METHODOLOGY

It was a retrospective review of the cancer cases registered over an eighteen-year time period, extending from December 29, 1994 till December 31, 2012, at SKMCH & RC within the electronic Hospital Information System. Summaries were obtained for gender, age-group, and cancer type. The most commonly diagnosed cancers were stratified in: (i) all age-groups, both genders combined, (ii) adults (> 18 years), (iii) adult males (> 18 years), (iv) adult females (> 18 years), and (v) children (≤ 18 years) and results presented for the top three ranking malignancies. Effective 2004, stage and grade of the disease were also added to the Registry database, among other variables. Therefore, for a subset of the cases recorded in a nine-year time period between January 1, 2004 and December 31, 2012, summaries were also generated for stage and grade of the disease, along with age, for the three top ranking cancers among: (i) adult males, (ii) adult females, and (iii) children. Stage was classified according to the American Joint Committee on Cancer,[4,5] French American British classification system for leukemia,[6] Binet and Rai clinical staging for chronic lymphocytic leukemia,[7] National Cancer Institute's stages for chronic myelogenous leukemia,[8] and National

Health Service's Manual for cancer,[9] whereas, grade was classified according to the ICD-O-3 system.[3] Also, summaries were obtained on addiction and family history of cancer.

The Statistical Package for Social Sciences (SPSS), version 19, software was used to generate the results (counts and percentages) for variables under consideration. Results were presented as counts and percentages. The Institutional Review Board was informed about the study and exemption from full review granted as the study was retrospective in nature and information being presented was without any personal identifiers.

RESULTS

In about an 18-year study period, a total of 58,761 neoplasms were registered at the Hospital. Of these, 55,974 (95.25%) were malignant cases. The malignant cases involve adult males in 23,971/55,974 (42.83%), adult females in 25,794/55,974 (46.08%), and children in 6,209/55,974 (11.09%) cases. The distribution of cases by cancer type for three most common malignancies, stratified by the five aforementioned groups, is shown in Table I.

For a subset of the cases, Table II shows the distribution of cancers and also the descriptive statistics for age at

Table I: Top three malignancies by gender and age-group in an eighteen-year time period (December 29, 1994 to December 31, 2012).

Top 3 malignancies→	1-Count (%)	2-Count (%)	3-Count (%)	Total N
All age-groups, both genders combined	Breast cancer 11,853 (21.18%)	Leukemia 3,368 (6.02%)	Lip and oral cavity 3,336 (5.96%)	55,974
Adults (> 18 years)	Breast cancer 11,848 (23.81%)	Lip and oral cavity 3,291 (6.61%)	Liver/intrahep. bile ducts 2,836 (5.70%)	49,765
Adult males (> 18 years)	Liver/intrahep. bile ducts 2,076 (8.66%)	Lip and oral cavity 2,047 (8.54%)	NHL[2] 1,779 (7.42%)	23,971
Adult females (> 18 years)	Breast cancer 11,726 (45.46%)	Ovary and uterine adnexa 1,524 (5.91%)	Lip and oral cavity 1,244 (4.82%)	25,794
Children (≤ 18 years)	ALL[3] 1,345 (21.66%)	HL[4] 1,099 (17.70%)	NHL 694 (11.18%)	6,209

[1]Liver and intrahepatic bile ducts;   [2]NHL: Non-Hodgkin's Lymphoma;   [3]ALL: Acute Lymphoblastic Leukemia;   [4]HL: Hodgkin's Lymphoma.

Table II: Distribution of cancer cases at SKMCH & RC by age, history of addiction, family history of cancer, disease grade, and disease stage among adult males, adult females, and children, in a nine-year time period (January 1, 2004 to December 31, 2012) (Total=34,508).

Age group	Adult male (N=14,893)			Adult female (N=15,980)			Children (N=3,635)		
Cancer type by ranking →	1- Liver and intra-hepatic bile ducts	2-Lip and oral cavity	3-Prostate	1-Breast	2-Ovary and uterine adnexa	3-Lip and oral cavity	1-HL	2-ALL	3-NHL
Count	1,606	1,316	1,222	7,279	873	798	766	620	421
Percentage	10.78%	8.83%	8.20%	45.55%	5.46%	4.99%	21.07%	17.05%	11.58%
Presenting age in years: Mean (range)	57.95 (19-92)	52.56 (19-94)	67.19 (38-100)	48.10 (19-102)	46.96 (19-91)	53.43 (19-90)	9.93 (1-18)	5.81 (1-18)	10.03 (0-18)
History of addiction:									
Most common	Smoker	Smoker	Smoker	Smoker	Smoker	Betel leaf	Smoker	Smoker	No
Yes	731	847	332	63	14	247	2	1	0
No	697	356	410	3339	450	471	536	385	263
Not known	178	113	480	3878	409	80	228	234	158
Family history of cancer:									
Yes	156	59	79	1490	150	35	81	49	36
No	1149	1000	688	4511	532	604	574	474	321
Not known	301	257	455	1278	191	159	111	97	64
Disease grade or classification[1]:									
1	37	475	23	122	49	48	MC[2] 442	B-cell 456	B-cell 170
2	16	479	219	2619	101	299	NS[3] 178	T-cell 78	T-cell 37
3	17	118	719	3379	190	82	LP[4] 16	NK-cell 0	NK-cell 1
4	1	3	9	4	7	3	LR[5] 8	N/A 85	N/A 205
Not known		241	252	1153	526	166	LD[6] 4		
							NOS[7] 118		
Disease stage:									
0	0	0	0	148	0	0	0	-	0
1	307	108	21	463	184	74	51	-	50
2	259	154	180	3812	71	88	229	-	83
3	664	199	113	1467	262	122	305	-	167
4	151	655	460	472	119	382	161	-	96
Unstageable	225	200	448	917	236	132	20	-	25
Other staging								LI:315	

[1]Classification given for diseases in the last 3 columns;   [2]MC: Mixed Cellularity;   [3]NS: Nodular Sclerosis;   [4]LP: Lymphocyte Predominance;   [5]LR: Lymphocyte Rich;   [6]LD: Lymphocyte Depletion;   [7]NOS: Not Otherwise Specified.

Table III: Rank order of top three cancers by centre[12] and proportional distributions, where available.

Cancer type according to ranking → Center, time-period and gender ↓	No. 1	No. 2	No. 3
SKMCH and RC, Lahore 9 years (N=36,641) January 1, 2004 - December 31, 2012			
M	Liver ca-9.3%	Lip & Oral cavity-7.7%	NHL-7.7%
F	Breast ca-42.3%	Ovarian ca-5.5%	Lip & Oral cavity-4.7%
KIRAN, Karachi 9 years (N=16,351) January 1, 2000 - December 31, 2008			
M (7,865-48.1%)	Head & neck ca-32.6%	Gastrointestinal ca-6.9%	Lymphomas-6.1%
F (8,486-51.8%)	Breast ca-38.2%	Head & neck ca-15.1%	Cervical ca-5.5%
CMH, Multan 6 years (N=930)[13] 2002 - 2007			
M (552-59.4%)	Leukemia-NA[14]	Prostate ca-NA	Urinary bladder ca-NA
F (378-40.6%)	Leukemia-NA	Breast ca-NA	Skin ca-NA
AIMC, Lahore 5 years (N=1,500)[15] January 1, 1997 - December 31, 2001			
M (715-47.7%)	Leukemia-23.6%	NHL-15.1%	Lung ca-7.5%
F (785-52.2%)	Breast ca-38.5%	Ovarian ca-13.6%	-
AKUH, Karachi Div. 2 years (N=11,368) January 1, 1998 - December 31, 1999			
M (5,934-52.2%)	Oral cavity-10.2%	Bronchus, lung ca-9.8%	NHL-6.8%
F (5,434-47.8%)	Breast ca-34.3%	Oral cavity-7.7%	Ovarian ca-4.0%

[12] SKMCH & RC: Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore; KIRAN-Karachi Institute of Radiotherapy and Nuclear Medicine, Karachi; CMH-Combined Military Hospital, Multan; AIMC-Allama Iqbal Medical College, Lahore; AKUH-Aga Khan University Hospital, Karachi.
[13] Hematological malignancies were available for about four years only i.e., from Jan. 2005 to May 2008.
[14] NA: Not Available.
[15] Patients included were 15 years or older.

presentation, history of addiction, family history of cancer, grade of the disease, and stage of the disease for the three most commonly diagnosed malignancies, in a 9-year time period between January 1, 2004 and December 31, 2012. During this period, 34,508 cases were recorded. Of these, nearly 98% belonged to Pakistan, whereas, approximately 2% belonged to other countries of the world. The distribution was 25,173/34,508 (72.95%) cases from Punjab; 5,817/34,508 (16.86%) from Khyber Pakhtoonkhwa; 965/34,508 (2.80%) from Sindh; 683/34,508 (1.98%) from the neighbouring country of Afghanistan; 510/34,508 (1.48%) from the Federally Administered Tribal Areas; 502/34,502 (1.46%) from the Federal Capital; 466/34,508 (1.35%) from Balochistan; 336/34,508 (0.97%) from Azad Jammu and Kashmir; 42/34,508 (0.12%) from Northern Areas; 12/34,508 (0.03%) from other countries of the world, and in 2/34,508 (< 0%) cases, addresses were not mentioned. Those belonging to Lahore district of Pakistan were 10,207/34,508 (29.58%) of the total cases recorded.

A history of addiction was present in 6,596/34,508 (19.11%) patients, absent in 16,079/34,508 (46.6%) patients, and not known in 11,833/34,508 (34.29%) patients. The commonest addictions were smoking, alcohol, *naswar* and betel leaf consumption. Family history of cancer was present in 3,840/34,508 (11.13%) cases, absent in 22,780/34,508 (66.01%) cases, and not known in 7,888/34,508 (22.86%). Adult males had liver and intrahepatic bile ducts' cancer in 1,606/34,508 (10.78%), lip and oral cavity cancers in 1,316/34,508 (8.83%), and prostate cancer in 1,222/34,508 (8.20%). Adult females had breast cancer in 7,279/34,508 (45.55%), ovary and uterine adnexa malignancy in 873/34,508 (5.46%), and lip and oral cavity cancers in 798/34,508 (4.99%). Children had Hodgkin's Lymphoma (HL) in 766/34,508 (21.07%), Acute Lymphoblastic Leukemia (ALL) in 620/34,508 (17.05%), and Non-Hodgkin Lymphoma (NHL) in 421/34,508 (11.58%).

DISCUSSION

The SKMCH & RC registry is an extensive database of the patients attending the facility for diagnosis and management of cancer. In terms of malignant cases recorded, the numbers are large. The fact that the Registry is recording information on many variables, including the disease grade and stage reflects how detailed the information being recorded is. The eighteen-year and nine-year results show the distributions of cancers but, like any other hospital of the country, it is difficult to extrapolate the findings to the general population of the country; nevertheless, the results from the vast database are invaluable.

The distribution of the cancer type was more similar than different from the 18-year time period recorded above. NHL was the third common malignancy in the longer time period but prostate was recorded to be the third in the list for the 9-year time period. Also, in children, although the order changed but HL, ALL, and NHL were among the top three malignancies registered at the

Hospital. Mostly, the average age at presentation has been on the lower side. Moreover, cigarette smoking was the commonest addiction recorded, apart from betel leaf use seen in lip and oral cavity cancer. A family history of cancer was recorded in breast cancer, being present in about 20% of the cases. In children, in about 10% of the cases, a family history of cancer was recorded. In the vast majority of cases, a family history of cancer was not present. This may reflect that there are more sporadic than genetic cases in the population but warrants extensive studies in order to draw a conclusion.

Further, there were not many cases with a low grade of disease. Also, the stage was advanced in many cases. This suggests a low level of awareness about the symptoms related to various diseases. Reasons for not being able to stage the disease included incomplete information related to the disease with the patient either presenting after having undergone surgery elsewhere, having received part of a treatment at the Hospital, or having been lost to follow-up during staging work-up.

It is noticeable that breast malignancy accounted for a significant proportion of the disease among adult females. The average presenting age for breast cancer was around 48 years and it is similar to what has been reported in the past.[10] Most of the breast cancer patients presented at an advanced stage in the natural history of the disease and had a high disease grade. This is consistent with what has been reported for another main hospital of the city.[11] However, this is in sharp contrast to the Surveillance, Epidemiology, and End Results program, where 61% of the breast cancers were localized to the primary site, 32% were spread to the regional lymph nodes, 5% had metastasized to distant sites, and 2% were of unknown stage.[12] Nevertheless, comparison with a population-based registry of a developed country is likely to highlight the differences in the stage and grade distributions between the two countries. Also, the tables show that the distributions of unknown stage vary by cancer site. This is similar to what has been reported for a SEER report.[13]

In Table III, reports from other big centres of the country, for different time periods, show varying distributions of cancer types that may be attributable to a referral bias and patient triage.[14-16] Molecular, environmental, and genetic factors may also have contributed to the variations, but this can be verified once large-scale, population-level studies have been conducted in different regions of the country. However, either leukemia or lymphoma and breast cancer were reported in the top-three list from all of the five centres studied. Moreover, the distributions of males and females were more similar than different, except for those seen in Multan.[15] Again, the possibility of a referral bias in this case cannot be ruled out.

The utility of hospital-based cancer registration cannot be denied at all. But beyond hospital-based cancer registration is the area of population-based cancer registration. So far, the only functioning population-based registry in Pakistan is the Karachi Cancer Registry (KCR),[17] accounting for less than 1% of the total population of the country.[17,18] The work done for KCR is undoubtedly a true example of a substantial amount of work done to make a registry functional, with significant coverage of the population under study. Attempts are being made in Lahore to motivate professionals from different institutions to report out their cases to the Punjab Cancer Registry (PCR) which, until now, has been collating the results for Lahore district only.[19] Because the reporting to PCR is not a hundred percent complete, the results need to be interpreted with caution.

It would be an ideal situation to have functioning regional and national cancer registries in Pakistan. However, given the current scenario in Pakistan, a country marred by problems as resource constraints, natural calamities, and infectious diseases, setting-up a country-wide (national), population-based cancer registry, and getting valid results from it, seems unlikely in the near future. Patient registration and acceptance into a facility for diagnosis and management is governed by each centre's policy on such issues. Therefore, to get an idea about the disease burden in the country, it would be worthwhile for various centres to work together to collate their results, after devising a system that would take into account checking for duplicate records, among other issues, to minimize the over-reporting of cancer cases. This approach can be an invaluable one as pathology-based cancer data can be very useful in gauging the patterns of cancer within a population, provided the information on the demographics of the patient is carefully collected.[20]

CONCLUSION

Hospital-based cancer registries can be a useful resource for getting an estimate of the number of cancers diagnosed in a region. Putting all the information together, from different cancer treatment hospitals and oncology departments of other main hospitals, and getting an approximate figure for the burden of the disease in the community, could assist in program planning and evaluation, thereby, leading the way for developing the infrastructure and establishing dedicated facilities to cater to the needs of the patients marred by this disease.

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