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Prevalence of Cancer Types in Patients attending Mayo Hospital Lahore, Pakistan

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Abstract:
This study aimed to determine the prevalence of cancer types in patients attending Mayo Hospital Lahore, Pakistan. A retrospective study was conducted and the data was obtained from the medical record of the hospital for period of 2 years that is from 2016 to 2017. A predetermined scheme of analyzing individual files of patients attending the hospital for the study period was followed. All data were collected using standardized data collection Performa. Data were analyzed by using SPSS-20 and presented in the form of percentages and frequencies. During the study period, a total of 3610 patients were registered in the hospital. One thousand seven hundred and fifty-seven (48%) were male while one thousand eight hundred and fifty-three (52%) were female. The number of patients diagnosed throughout the study period was dominated in the year 2016 was 1820 (50.41%) patients. Eleven hundred and nineteen (31%) cases were from cancer of the genital system among them the carcinomas of breast were most prevalent 760 (21.05%). Digestive system tumors were 618 (17.11%) followed by oral cavity cancer 388 (10.73%). All the patients of oral cavity cancer were smokers or pan eaters or use some kind of drugs. Respiratory system tumors were 280 (7.75%). Head and Neck tumors recorded 214 (5.92%) cases. Blood cancer cases were 228 (6.31%) followed by Lymphoma 206 (5.7%) of total cases. Urinary system tumors were recorded in 161 (4.45%) cases. The cancer of different glands accounts for 84 (2.32%) of total cases. Primary unspecified region tumors highlighted 32 (0.88%) of the total cancer cases. Stages of only n=448 (12.4%) patients were mentioned out of n=3610 patients. The majority of the patients (70%) were reported at the 4th stage of cancer which is the most advanced stage of cancer and has very few chances of survival. The study concluded that the incidence rate of genital system tumors was highest among all cancer types during the study period. Further investigation should be done to find out the cause of cancer so that better prevention should be done.
Keywords: Cancer prevalence, urinary system tumors, genital system tumors, breast cancer.

INTRODUCTION

Cancer is the second leading cause of death worldwide. According to an estimate from International Agency for Research on Cancer (IARC), there were 18.1 million cancer cases reported worldwide. In addition, there were 9.6 million cancer deaths worldwide because of cancer in 2020, so it is the need of time to get control over cancer by more study, awareness, and research (Ferlay *et al.*, 2019; Irfan *et al.*, 2016).

Cancer (KAN-ser) a term for diseases in which abnormal cells divide without control and can invade nearby tissues. Cancer cells can also spread to other parts of the body through the blood and lymph system (Hamid *et al.*, 2016). Cancer is a disease that involves changes or mutation in the cell genome or DNA structure of the cell (Ali *et al.*, 2015; Irfan *et al.,*, 2016). Throughout our lives, healthy cells in our bodies divide and replace themselves in a controlled fashion, but when a cell altered somehow so that it multiplies out of control and form a tumor. Most cancers form tumors but not all tumors are cancerous (Hejmadi, 2014).

Cancer is a very ancient disease and records for the complaint are found throughout history and it was also evidently found in fossil bones and Egyptian mummies (Foulds, 1958; Sudhakar, 2009). The oldest cancer explanation dates back to 3000 BC in Egypt although in this record word cancer was not used. The origin of the word cancer is credited to Hippocrates (370-460 BC). He used the word Carcinos and carcinoma, the Greek word for crab, to describe the finger-like projections from cancer. After Hippocrates, a Roman physician Celsus (28-50 BC) translated this Greek word in cancer, the Latin word for cancer (Feinberg *et al.*, 2006; Hajdu, 2011).

Pakistan is the seventh most populous country and the rate of cancer is also high in Pakistan (Idrees *et al.*, 2018; Wadhwa *et al.*, 2011). The most commonly diagnosed cancers in Pakistan are breast cancer (Asif *et al.*, 2014; Din *et al.*, 2016; Menhas and Umer, 2015), lung cancer (Majeed *et al.*, 2019), liver cancer (Wadhwa *et al.,*, 2011), oral cavity cancer (Begum *et al.*, 2009), bone cancer (Badar and Mahmood, 2017; Rafiq, 2012), blood cancer (Andleeb Masood *et al.*, 2018), ovarian, uterus and cervical cancer (Batool *et al.*, 2017), stomach cancer, pancreatic cancer (Bhurgri, 2004), testicular cancer (Sarfraz *et al.*, 2015), colorectal cancer (Hasan *et al.*, 2017), urinary bladder cancer, lymphoma, and the cancer of prostate gland (Idrees *et al.,*, 2018). The exact mortality rate and the number of cancer cases are unknown because of the lack of any cancer registry database in Pakistan. But in Karachi the biggest city of Pakistan with two crore population (KCR) Karachi cancer registry was developed to determine the prevalence of cancer, KCR determines the prevalence of different cancer types in Pakistan from 2000 to 2008 (Bhurgri *et al.*, 2006).

The mortality rate of cancer is high in Pakistan and other developing countries. One of the major causes of the high mortality rate of cancer in Pakistan is lack of awareness, a survey in Pakistan shows that about 67% of the people either do not know properly about any cancer hospital and only 14% knew about the presence of about 5 cancer hospitals in Pakistan. People of the urban areas are more aware of cancer as compared to the rural population. This difference might be due to the difference in literacy rate, the urban population has better educational facilities as compared to the rural population, and most of the people of urban areas are educated and aware of cancer and risk factors (Sobani *et al.*, 2012).

The current study aimed to determine the prevalence of cancer types in patients attending Mayo Hospital Lahore, Pakistan.

MATERIALS AND METHODS

The present study was conducted at Mayo Hospital Lahore which included cancer cases registered during the year 2016-2017. In

the proposed study duration February 2018-June 2018, case files of n=3610 patients were analyzed. The study was approved by the institutional research committee and the anonymity of patients was protected. All data were collected using standardized data collection Performa. Record room of the oncology department Mayo Hospital Lahore is present on the ground floor. This room maintains the data from 1973. Files are arranged in descending order according to the file number. There were about 4600 patients reported with diagnosed cancer in the last two years from 2016-2017, but the data of only 3610 patients were available. There were 2337 patients reported in 2016 but the data of only 1820 patients were available, similarly, 2300 patients were reported in 2017 but available data was only of 1790 patients. Other files were missing because some cases were still running in different departments of oncology, such as radiology, surgery, and chemotherapy that is why the date of those files was not available. So the rate of cancer and mortality rate was determined from the remaining 3610 files.

Data were collected from the files of registered patients of last two years 2016-2017 and then the collected data was put in excel. Six parameters were observed, the rate of cancer, diagnosis, gender, age, stage of cancer, and area to which the patient belonged, and the number of patients who were expired at the hospital. History of patients was also noted to find out the risk factors of cancer, family history of the patient, and early symptoms of the disease. The collected data was analyzed by using SPSS-20 and presented in the form of percentages and frequencies.

RESULTS

During the study period, a total of 3610 patients were registered in the hospital. One thousand seven hundred and fifty-seven (48%) were male while one thousand eight hundred and fifty-three (52%) were female. The number of patients diagnosed throughout the study period was dominated in the year 2016 was 1820 (50.41%) patients. Eleven hundred and nineteen (31%) cases were from cancer of the genital system (88% female and 12% male), among them, the carcinomas of the breast were most prevalent (21.05%) followed by ovarian cancer (3.26%), prostate cancer (2.21%), cervical cancer (1.85%), uterine cancer (1.46%), testicular cancer (0.85%), and the cancer of the vulva (0.22%) and vagina (0.055) (Table 1).

Six hundred and eighteen (17.11%) cases belonged to digestive system tumors (36% female and 64% male), among them, liver cancer was the most prevalent (7.28%) followed by colon cancer (2.32%), rectum cancer (1.66%), esophagus cancer (1.52%), stomach cancer (1.38%), pancreas cancer (1.08%), gall bladder cancer (1.05%), anus cancer (0.41%), intestine cancer (0.36%), and cancer of the spleen (0.03%) (Table 1).

Three hundred and eighty-eight (10.73%) cases were reported for oral cavity cancer (36% female and 64% male). Among the oral cavity cancers, mouth cancer was the most prevalent (7.81%), followed by tongue cancer (2.71%), and the cancer of the pharynx (0.22%). All the patients of oral cavity cancer were smokers or pan eaters or use some kind of drugs. Two hundred and eighty (7.75%) cases were documented for the respiratory system tumors (25% female and 75% male), among them lung cancer was the most prevalent (6%) followed by larynx cancer (0.96%), and the cancer of nasal cavity (0.80%) (Table 1).

Head and Neck tumors recorded two hundred and fourteen (5.92%) cases (40% female and 60% male). Brain cancer was the most prevalent (4.10%) followed by eye cancer (1.49%), and cancer of the ear (0.27%). Two hundred and twenty-eight (6.31%) cases were reported for blood cancer (39% female and 61% male) followed by two hundred and six (5.7%) lymphoma cases (33% female and 67% male) of total cancer types (Table 1).

Urinary system tumors were recorded in one hundred and sixty-one (4.45%) cases (25% female and 75% male), among urinary bladder cancer was more prevalent (2.93%) followed by kidney cancer (1.52%). The cancer of different glands was recorded in eighty-four (2.32%) of total cases (57% female and 43% male). Among these cancers, the cancer of the thyroid gland was most prevalent (0.96%), followed by the cancer of parotid gland (0.72%), adrenal gland and salivary gland (0.22% each), neuroendocrine (0.11%), pituitary gland (0.06%) and sweat gland (0.03%). One hundred and sixty-three (4.45%) patients were reported with bone cancer, followed by sixty-eight (1.88%) patients of skin cancer, and thirty-nine (1.08%) patients of soft tissues cancer. Primary unspecified region tumors highlighted thirty-two (0.88%) of the total cancer cases (Table 1).

Stages of only four hundred and forty-eight (12.4%) patients were mentioned out of 3610 patients. The majority of the patients (70.7%) were reported at the 4th stage of cancer which is the most advanced stage of cancer and has very few chances of survival. 20.7% of patients were reported at the 3rd stage of cancer, followed by 7.8% at the 2nd stage of the disease. Only 0.6% of patients were diagnosed at 1st stage of cancer (Table 2).

Table 1. Prevalence of cancer from 2016-17 in Mayo hospital Lahore.

Sr. No.	Site of cancer	Total no. of patients	%age	Male	Female
1	**All sites**	**3610**	**100%**	**1757**	**1853**
2	**Head and neck region**	**214**	**5.92%**	**130**	**84**
3	Brain	149	4.10%	91	58
4	Eye	54	1.49%	32	22
5	Ear	10	0.27%	7	4
6	**Oral cavity**	**388**	**10.73%**	**249**	**139**
7	Mouth	282	7.81%	189	93
8	Tongue	98	2.71%	58	40
9	Pharynx	8	0.22%	2	6
10	**Digestive system**	**618**	**17.11%**	**394**	**224**
11	Esophagus	55	1.52%	32	23
12	Stomach	50	1.38%	28	22
13	Intestine	13	0.36%	8	5
14	Colon	84	2.32%	55	29
15	Rectum	60	1.66%	39	21
16	Anus	15	0.41%	11	4
17	Liver	263	7.28%	181	82
18	Gall bladder	38	1.05%	14	24
19	Spleen	1	0.03%	1	0
20	Pancreas	39	1.08%	25	14
21	**Respiratory system**	**280**	**7.75%**	**209**	**71**
22	Nasal cavity	29	0.80%	16	13
23	Larynx	35	0.96%	28	7
24	Lung	216	6%	165	51
25	**Bones**	**163**	**4.50%**	**111**	**52**
26	**Skin**	**68**	**1.88%**	**40**	**28**
27	**Soft tissue**	**39**	**1.08%**	**27**	**12**
28	**Genital system**	**1119**	**31.00%**	**131**	**988**
29	Breast	760	21.05%	20	740
30	Ovary	118	3.26%	0	118
31	Uterus	53	1.46%	0	53
32	Cervix	67	1.85%	0	67
33	Vulva	8	0.22%	0	8
34	Vagina	2	0.055	0	2
35	Prostate	80	2.21%	80	0

36	Testicular	31	0.85%	31	0
37	**Urinary system**	**161**	**4.45%**	**121**	**40**
38	Urinary bladder	106	2.93%	85	21
39	Kidney	55	1.52%	36	19
40	**Glands**	**84**	**2.32%**	**36**	**48**
41	Salivary gland	8	0.22%	6	2
42	Thyroid gland	35	0.96%	12	23
43	Parotid gland	26	0.72%	14	12
44	Sweat gland	1	0.03%	0	1
45	Pituitary gland	2	0.06%	2	0
46	Neuroendocrine	4	0.11%	1	3
47	Adrenal gland	8	0.22%	1	7
48	**Lymphoma**	**206**	**5.70%**	**138**	**68**
49	**Blood cancer**	**228**	**6.31%**	**139**	**89**
50	**Blood vessel**	**1**	**0.03%**	**1**	**0**
51	**Unspecified primary**	**32**	**0.88%**	**23**	**9**

Table 2. Number of patients at different stages of cancer.

Sr No.	Stages	2016	2017	Total patients	%age
1	1	2	1	3	0.66
2	2	23	12	35	7.81
3	3	61	32	93	20.7
4	4	212	105	317	70.7
5	**Total patients**	**298**	**150**	**448**	**100%**

DISCUSSION

In the last two years (2016-17) 3610 patients were reported in Mayo hospital Lahore n=1757 were males while n=1853 females, males were 48.6% and females were 51.32%. A high percentage of breast cancer in females was responsible for high cancer rates in females while the rate of cancer of the respiratory system, digestive system, oral cavity, blood, and lymphoma was much higher in males as compared to females.

Our results showed that 1119 (31%) cases were from cancer of the genital system (88% female and 12% male), among them, the carcinomas of the breast were most prevalent. The incidence rate of breast cancer is clearly on the rise, which is indicative of aggressive screenings and detections (Ahmad, 2019; Asif *et al.,*, 2014). The incidence rate of breast cancer varies greatly with race and ethnicity and is higher in developed countries (Momenimovahed and Salehiniya, 2019). In women, breast cancer was the most frequently diagnosed cancer in all regions of the world, except in Eastern Africa where cervical cancer dominated (Ferlay *et al.,*, 2019). BRCA mutations are responsible for young-onset breast cancer in women (Ashraf *et al.*, 2018). Reproductive factors that increase risk include a long menstrual history, nulliparity, and current use of postmenopausal hormone therapy or oral contraceptives (Tonkelaar *et al.*, 2001). Cervical, endometrial, and ovarian cancers are relatively common and cause significant cancer morbidity and mortality worldwide, whereas vulvar, vaginal, fallopian tube cancers, and choriocarcinomas are rare (Weiderpass and Labrèche, 2012).

Cancer of the digestive system is the second most commonly diagnosed cancer in 2016-17, there were 618 (17.1%) patients with cancer of the digestive system (36% female and 64% male), which accounts for 17.11% of total cancers. The rate of digestive system cancer was higher in males as compared to females. The most prevalent cancer type was liver cancer. Liver cancer accounts for 7.28% of total cancers. Global statistics show that

Hepatocellular carcinoma is the 5th most common cancer, and accounts for the top three causes of death in the Asia-Pacific region (Ali *et al.,*, 2015; Bosch *et al.*, 2004). The high rate of stomach cancer in developing countries as compared to developed countries was documented in previous studies. The reason of stomach cancer is poor quality food, preserved food, alcohol consumption and smoking (Bertuccio *et al.*, 2009). It has been reported that aspirin is associated with a reduced risk of colorectal cancer, and possibly of a few other digestive tract cancers (Bosetti *et al.*, 2020).

Our results showed that oral cavity cancer account for 10.73% of total cancer cases. According to patient histories, 90% of patients of the oral cavity were smokers, pan eaters, or use some kind of drugs. This research showed that the cancer of the oral cavity is the third most prevalent form of cancer in Pakistan after the genital system and digestive system cancer. Oral cavity cancer has been documented as the 11th most common malignancy in the world (Ghantous and Abu Elnaaj, 2017; Gupta *et al.*, 2016). Smoking and ingestion of alcohol are the major risk factors of oral cavity cancer (Pelucchi *et al.*, 2006). A recent study reported the incidence of oral candidiasis in patients who use chronic antibiotics, chewing qat, and tobacco smoking (Alhamzi and Maqtari, 2018).

Cancer of the respiratory system accounts for 7.75% of total cancers. There was a high rate of respiratory system cancer among males as it is the second most prevalent cancer after liver cancer. The surveys from patients showed that about 90% of patients of the respiratory system were smokers or use some kind of drugs. Lung cancer is the leading cause of cancer death among men and the second leading cause of cancer death among women worldwide (Torre *et al.*, 2016). Metastatic sites and survival in metastatic lung cancer are influenced by sex, histological subtype, and age at diagnosis (Riihimäki *et al.*, 2014). A major risk factor of lung and respiratory system cancer is smoking (Hueper, 2013). Smoking accounts for 80% of the worldwide lung cancer burden in males and 50% of the burden in females. Chinese females have a high cancer rate because females also start smoking. Other reasons for lung cancer in females are indoor air pollution from unventilated coal-fuelled stoves and cooking fumes (Ezzati and Lopez, 2003). In Karachi 36% of males were smokers while tobacco smoking was also practiced by 9% of females, that's why there was a high rate of lung cancer in Karachi (Aziz *et al.*, 1999).

There were 5.92% cases of head and neck region cancer among other cancer types. Brain cancer was more prevalent than other cancers from the head and neck region. The rate of brain cancer was higher in males than females. An incidence rate of 5%- 50% has been reported in various countries (Ajayi *et al.*, 2007). According to research in Jordanians, the brain and some other cancers of the central nervous system account for 4.8% of total cancers (Inskip *et al.*, 2003), their results are much close to our research results. The rate of brain cancer was reported 3.4% in Israel Arabs and 3.1% in Egyptians and the incidence of the disease was higher in males than females in Arab countries. The global variation may be due to differences in sociocultural characteristics, risk factors, and data collection (Effiom *et al.*, 2008). There is a significant risk of brain tumors from cell phone use (Sadetzki *et al.*, 2005).

Our results showed that blood cancer accounts for 6.31% of total cancer cases. According to the annual report of SKMCH&RC 2016, the rate of blood cancer accounts for 6.32% of total cancers (Mahmood *et al.*, 2016), this result much closely resembles the results of the current study. There was no association between systolic or diastolic blood pressure and total cancer incidence or deaths due to cancer (Grove *et al.*, 1991). Lymphoma account for 5.70% of total cancers, its prevalence was double in males as compared to females. According to the annual report of SKMCH&RC 2016, lymphoma account for 9.55% of total cancers, Hodgkin lymphoma 4.90%, and Non-

Hodgkin lymphoma 4.65% of total cancer rate (Mahmood *et al.*,, 2016). Risk factors of lymphoma are certain occupational threats like exposure to chemicals such as benzene and fertilizers etc. The residential area of most patients may have extreme or frequent exposure to pesticides and herbicides (Aziz *et al.*,, 1999).

Urinary system cancer account for 4.45% of total cancers, the number of male patients was three times higher than females. According to the global statistics of urinary bladder cancer, n=386,300 new cases and 150,200 deaths from bladder cancer occurred in 2008 worldwide (Jemal *et al.*, 2011). The results of the current study are much close to a previous study where the rate was 3.7% of all cancer cases while we have the rate of 2.93% (Ferlay *et al.*, 2010). Major risk factors of urinary bladder cancer are smoking and occupational exposure and chronic infection of *Schistosomiasis hematobium* which accounts for 50% of the total cancer burden (Parkin, 2006).

The cancer of different glands was recorded in 2.32% of total cases. Various studies have reported the incidence of tumors in glands (Boukheris *et al.*, 2009; Bradley and McGurk, 2013; Stennert *et al.*, 2003). The incidence of bone cancer, skin cancer, and cancer of soft tissues was (4.45%), (1.88%), and (1.08%) respectively. Various studies have documented the incidence of these cancer types (Huvos *et al.*, 1985; Yang *et al.*, 2019). Primary unspecified region tumors were found in 0.88% of the total cancer cases. Cancer of unknown primary is diagnosed at a metastatic stage, conferring an unfavorable prognosis (Hemminki *et al.*, 2012; Hemminki *et al.*, 2016).

There are four stages of cancer, these stages show the advancement of the disease. Our results showed that about 70.7% of patients come to the hospital at the most advanced stage of the disease. Major factors which are responsible for late-stage diagnosis can be lack of awareness, ignorance of early symptoms, and the prolonged diagnostic procedure (Biopsy, ultrasound, bone scan, blood tests, etc.) (Baig *et al.*, 2019; Maghous *et al.*, 2016).

CONCLUSION

Cancer is a group of diseases, which is caused by the uncontrolled growth of cells. Cancerous cells can spread from one part to another part. Breast cancer was the most prevalent cancer; hormonal factors may be responsible for the highest rate of breast cancer. Breast cancer is the leading cause of death in females. Cancer of the oral cavity was the second most prevalent form of cancer, which is caused by smoking, pan eating, and drugs. Smoking is responsible for the cancer of the respiratory system, digestive system, and many other types of cancers. Chances of cancer occurrence increase with the increase in age. Most of the patients cannot recognize cancerous tumors at early stages because of unawareness that leads to a higher mortality rate. During the study period, the incidence rate of genital system tumors was highest among all cancer types. Further investigation should be carried out to determine the cancer risk factors so that better prevention should be done.

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