

EPIDEMIOLOGICAL DISTRIBUTION OF PEDIATRIC ONCOLOGY IN LAHORE, PAKISTAN

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ABSTRACT

Background & Objective: Globally incidence of cancer in pediatric population is increasing day by day. Among all pediatric malignancies leukemia shows the highest trend. The main objective of this study was to assess the person, place and time distribution of pediatric oncology in Lahore, Pakistan.

Methods: It was a cross-sectional study conducted in Children Hospital, Lahore, between January to July, 2017. A sample of 294 children suffering from different types of malignancies was collected through Non probability, Consecutive sampling technique. The data was collected using close ended questionnaires through interview techniques. Descriptive statistics were calculated and presented.

Results: Highest number of malignancies was reported among age group of 1 – 5 years which is 46.9%. Gender distribution showed male predominance as 61% were males and 39% were females. Acute lymphoblastic leukemia (53.7%) and Wilm's tumor (11.9%) was the most prevalent cancer. Mean number of cancer patients that visited Children Hospital during January 2017 to June 2017 is 248.6 ± 28.5 .

Conclusion: Acute Lymphoblastic Leukemia and Wilm's tumor is the most prevalent cancer in all age groups, being greatest among early childhood years (1-5) affecting more males than females.

Key Words: Pediatric oncology, Pattern, Lahore, Pakistan.

INTRODUCTION

Globally, 13% of all reported deaths are the result of various forms of cancer.¹ Every year, 150 children in one million are diagnosed with cancer.² Among all pediatric malignancies, leukemia has the highest incidence (31.4%) followed by brain tumors (17.6%) and lymphoma (12.4%) respectively.³ In developed countries, incidence of malignant diseases in children are 10%.⁴ Initially malignancies were considered fatal always but now with improvement in health care delivery, the survival rate of patients has increased to 80% in the last 2 decades.⁵ The increased survival rate is attributed to increased advances in medicine, better diagnostic procedures and better treatment options with identification of risk factors. Among developed countries, the incidence of childhood cancer per million children in the USA is 137.9, in the UK is 118.2, in Japan is 107.6 and in Kuwait is 110.⁶ In case of middle income countries, the incidence of childhood cancer per million in Philippines is 100.4 and in Thailand is 70.1. In low income countries like India, cancer incidence is 64.4, in Nigeria 71.2, and in Pakistan is 100 per million.⁶ Worldwide 70% of all cancer related deaths occur in low and middle income countries.⁶ The various reasons are poverty, decreased and ineffective incidence reporting, and the consequences of extensive

chemotherapy and radiotherapy leading to secondary diseases.⁷

Pakistan stands along with other developing countries of low income. The country spends 2% of its GNP on health care services. Due to poor funding there are few pediatric oncology centers. Unfortunately, there is no specific population-based study registry on pattern, mortality rates, or incidence reporting of pediatric cancers. On the basis of current limited data, approximately 8000 children suffer from cancers annually in Pakistan, out of which less than 50% are promptly diagnosed and treated.⁸ A national cancer control program (NCCP) was formulated in Pakistan. The local biomedical literature in fields of oncology and cancer epidemiology is also severely deficient. Almost 3000 new patients with cancers present to hospitals every year in the Lahore district.⁹ Average annual incidence rate of all cancers per million children aged 0-14 years was recorded by cancer registries in Karachi (96/1000,000) whereas distribution of various cancers is given as such: lymphoid and hematopoietic tissue (45%), brain tumor (60%) and bone cancer (70%).¹⁰ In Jamshoro, the cancer studies carried out showed that the most common cancers are retinoblastoma (38.9%), Wilm's tumor (13.2%), brain tumor (10.6%), Hodgkin lymphoma (9.7%). According to a study, 669 patients

of cancer were reported under the age of 0 – 14, where 92% of these suffered from leukemia and 54% from lymphoma. Leukemia is the most prevalent cancer in age group of 1 – 12 years all over Pakistan which accounts for 21% of total pediatric cancers.¹¹

Since there has been no research in Lahore specifically on the pattern of pediatric oncology, the purpose of our research is to know the pattern and distribution of pediatric oncology in Lahore. These statistics can help in improvement of health care services provision to children suffering from cancer in Lahore, Pakistan. The main objective of this study was to assess the time, place and person distribution of children suffering with Malignancies in Paediatric Oncology ward of Children Hospital, Lahore.

METHODOLOGY

A cross sectional survey was conducted between January to July 2017 in Children hospital & Institute of Child Health, Lahore. A non probability, Consecutive sampling technique was used to collect sample of 294 children admitted in Pediatric oncology ward. The sample was collected on the current presence of all the patients in wards during the time of data collection. Children below 15 years of age irrespective of their age, gender, race and socioeconomic status were included in the study. Patients who were admitted but not diagnosed at the time of study were excluded from the study. IRB clearance was obtained from children hospital before collection of data. Data was collected by

using close ended questionnaire through interview technique. Data collectors were trained on the preformed questionnaire. Data was anonymous and was collected after informed consent from parents of these children. Data was kept confidential with the principal investigator. Data was entered in SPSS version 21. It was coded and cleaned. Data was presented in the form of Frequency charts, Bar charts and Pi charts. Time distribution is shown by time line. Only descriptive statistics were targeted to calculate.

RESULTS

The study aimed at the epidemiological distribution of patients suffering with different pattern of oncology in children hospital. The socio-demographic profile of parents showed that 147 (50%) of the fathers and 136 (46.3%) of the mothers were in the age group of (31 – 40 years). Majority of the parents, 90% of the fathers and 79.2% of the mothers were literate but the distribution of educational status showed that a vast majority were below matric. Distribution of monthly income showed that 75% of the fathers had a monthly income of less than Rs.25000/month whereas out of the 29 women who contributed as the earning hand 26 (8.8%) earned less than Rs.25000/month (Table 1).

High rates of tobacco consumption were seen in 26.7% of the fathers and mothers showed relatively low rate 4.4% of the mothers. When the family history of cancer was explored, it was observed that 40 (13.6%) mothers and 56 (19.2%) fathers had strong

Table 1: Socio-demographic Profile of Mother and Father.

<i>Father</i>			<i>Mother</i>		
	<i>Frequency</i>	<i>Percentage</i>		<i>Frequency</i>	<i>Percentage</i>
<i>Age Distribution:</i>					
20 – 30 years	55	18.7	20 – 30 years	131	44.6
31 – 40 years	147	50.0	31 – 40 years	136	46.3
41 – 50 years	71	24.1	41 – 50 years	26	8.8
51 years & Above	14	4.8	-	-	-
<i>Education Status</i>					
Illiterate	30	10.2	Illiterate	60	20.5
Primary	60	20.4	Primary	87	29.0
Secondary	47	16.0	Secondary	45	15.4
Matric	89	30.5	Matric	51	17.4
Intermediate	23	7.9	Intermediate	22	7.5
Bachelors & Above	45	15.3	Bachelors & Above	29	9.9

Monthly Income					
Below Rs. 25,000	219	75.0	Below Rs. 25,000	26	8.8
Above Rs. 25,000	65	25.0	Above Rs. 25,000	3	1.0
-	-	-	Not Applicable	265	90.1

family history of cancer thereby rendering their children genetically predisposed to the disease.

Age distribution of children suffering with oncological presentation showed that maximum number of patients 138 (46.9%) were reported between age 1 – 5 years followed by 6 – 10 years 106 (36.1%) respectively. Gender distribution of cases showed that 180 (61%) of the patients were males and only 114 (39%) were females. Geographic distribution showed that 83 (28.2%) were currently living in Lahore while 211 (71.8%) resided out of Lahore. Out of these, 55.4% belonged to rural areas while 44.6% patients came from urban settlements (table 2).

Table 2: Place and Person Distribution of Pediatric Oncology Patients in Children Hospital.

Age Distribution		
	Frequency	Percentage
1-5 years	138	46.9
6-10 years	106	36.1
11 years and above	50	17.0
Gender Distribution		
	Frequency	Percentage
Male	180	61
Female	114	39
Geographic Distribution		
	Frequency	Percentage
Lahore	83	28.2
Out of Lahore	211	71.8
Area Distribution		
	Frequency	Percentage
Rural	163	55.4
Urban	131	44.6

Pattern of malignancy of 294 patients showed that 158 (53.7%) suffered from Acute Lymphoblastic Leukemia being the most common diagnosis. Thirty five patients (11.9%) were diagnosed with Wilms Tumor, 32 (10.9%) with Hodgkin’s Lymphoma and 21 (7.1%)

with Non-Hodgkin’s Lymphoma. Other types included Acute Myeloblastic Leukemia, Ewing’s Sarcoma, Rhabdomyosarcoma, Hepatoblastoma, Renal cell carcinoma and many rare ones (Table 3).

Table 3: Presentation of Diagnosis.

Diagnosis	Frequency (n)	Percentage (%)
Acute Lymphoid Leukemia	158	53.7
Wilms Tumor	35	11.9
Hodgkin’s Lymphoma	32	10.9
Non-Hodgkin’s Lymphoma	21	7.1
Retinoblastoma	10	3.4
Acute Myeloid Leukemia	6	2.0
Ewing’s Sarcoma	6	2.0
Osteosarcoma	6	2.0
Miscellaneous**	25	8.5

**C cell hyperplasia, Hepatoblastoma, Neuroblastoma, Rhabdomyosarcoma, Renal Cell carcinoma, osteosarcoma, sacrococcygeal teratoma, yolk sac tumor

There were 60.9% of the children of aged 1 – 5 years at the time of diagnosis with 288 (98.0%) presenting with the disease for the first time. 168 (57.1%) patients reported with the type of cancer that affected blood followed by 45 (16%) whose lymphatic system was affected. Other types of cancer involved soft tissues/muscles, genitourinary and gastrointestinal systems, liver, nervous system and endocrinal system. 59.2% of the patients were at the benign stage of the disease followed by 55 (18.7%) at Stage I and 33 (11.2%) at Stage II. Only 2.4% patients had undergone metastasis (Fig. 1).

Time Distribution showed that the mean number of patients suffering with different type of malignancies visiting Children Hospital during January 2017 to June 2017 was 248.6 +/- 28.5. Maximum number of cases reported in June and July 2017 (Fig. 2).

DISCUSSION

Worldwide incidence of childhood cancers varies. In developed countries only about 2% of the cancer occurs in children but in developing countries the tumors

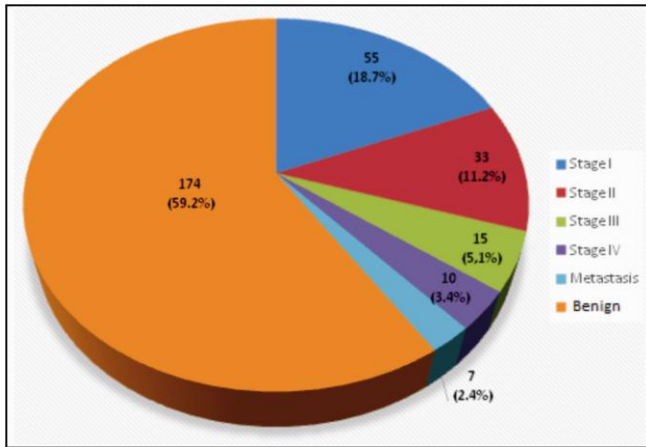


Fig. 1: Distribution of Patients According to Stages of Cancer.

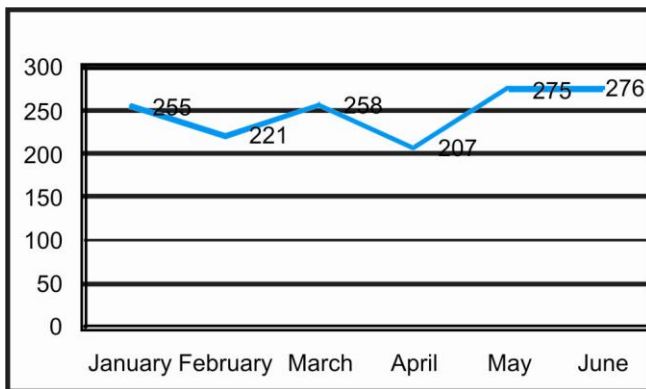


Fig. 2: Time Distribution of Patients according Presentation in Children Hospital and Institute of Child Health.

constitute 4.1 – 12.6% of all malignancies. In majority of the series males are reported to be more frequently affected than females and this was also observed in the present study.¹⁴ Another study was conducted on psychological outcomes and health beliefs in adolescent and young adults of childhood cancer and control shows that major cancers occur in early childhood (1 to 5 years of age).¹⁷ Our study shows peak incidence among age group of 1 – 5 years which is 46.9% followed by 6-10 years (36.1%) and 11 years and above which is 17.0%. According to a study conducted in US characteristic incidence peak is seen in age group of 2 – 4 years of age.¹⁵ Acute Lymphoblastic Leukemia incidence also peaks at 2 – 4 years of age.¹⁸ Studies conducted throughout the entirety of Pakistan have also shown similar presenting ages of patients, with a mean of 6.87 years.¹⁹

This study conducted in Children hospital of Lahore showed that Acute Lymphoblastic Leukemia and Wilm’s tumor were the most frequent in all age groups of childhood malignancies both in males and females. Other national studies and those from developing

countries showed lymph node malignancies to be most frequent¹⁴ which is contrary to our study. Acute Lymphoblastic Leukemia is the most commonly diagnosed cancer of childhood accounting for 26% of cancers diagnosed in those aged between birth to 14 years.¹⁸ According to a study conducted on clinical features and induction outcomes of childhood acute lymphoblastic leukemia in a lower middle income population: A multi institutional report from Pakistan indicated acute Lymphoblastic Leukemia as the most common childhood cancer.¹⁹

Among a total of 294 180 (61%) patients were male and 114 (39%) were females. In a study of cancer among children and adolescents in cancer hospitals of Pakistan 61% were males and 39 % were females.²⁰ In comparison, children within the United States show an almost equal presentation of pediatric cancers between the genders.²¹

In this study among 294 patients 158 (53.7%) suffered from acute Lymphoblastic leukemia being the most common diagnosis. 35 (11.9%) were diagnosed with Wilm’s tumor followed by 32 (10.9%) patients with Hodgkin’s Lymphoma and 21 (7.1%) with non Hodgkin lymphoma. The most common diagnosis that have been recorded in Shaukat Khanum, for under 14 years patients have been: males with leukemia, lymphoma, and then CNS tumors, and females with leukemia, CNS tumors and then retinoblastoma.²⁰ A Centre in Rawalpindi has also recorded the highest prevalent childhood tumors as acute Lymphoblastic Leukemia, Hodgkin’s Lymphoma and brain tumors, in subsequent order.²²

Stage 3 predominates in a study conducted on prevalence and clinical manifestations of lymphoma in North Eastern Nigeria¹⁶ this is contradicted in our study in which more than half of the patients under study were Benign (59.2%) followed by Stage 1 (18.7%), Stage 2 (11.2%), Stage 3 (5.1%), Stage 4 (3.4%) and Metastasis (2.4%). With regards to the residence of patients, we can see a significant difference, with 71.8% of patients residing outside of Lahore. Along with this, presentation of patients from rural and urban areas was almost similar, with a slightly larger population from rural areas (55.4%). The reasons for this can be attributed to better diagnostic and treatment options established in Lahore as compared to other cities, and a lack of tertiary care facilities especially in rural areas and smaller cities. Thus, most of the observed disease burden is not generated from within the city itself.

It is **concluded** that acute Lymphoblastic Leukemia and Wilm’s tumor is the most prevalent cancer in all age groups, being greatest among early childhood years (1 – 5 affecting more males than females).

RECOMMENDATIONS

The precise incidence of childhood cancer in Pakistan is not well documented or registered with anybody.

Pakistan lacks any significant cancer registry organizations. The Karachi Cancer Registry (KCR) was the first population-based registry of Pakistan and exists to facilitate the collection and analysis of incidence and prevalence data. Similar registries need to be established within major cities such as Lahore, along with bio data of new patients. This can be enormously useful when implementing a national cancer control plan.

Authors' Contribution

MHB: Conception of idea & Questionnaire development. AT: Literature search and write-up. IM: Conception of idea & Questionnaire development, Analysis & Overall supervision). SK: Data collection & Write-up. MAB: Data entry & Data analysis. MWM: Data collection & Literature search. TA: Data collection & Literature search. WM: Data collection & Literature search. SSM: Write up of Discussion. MF: Data collection in CH.

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Conflict of Interest

None.

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