



Original Article

Cancer Status in Pediatric Population of Chittagong, Bangladesh

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Abstract

Background: Cancer is increasing at an alarming rate worldwide and Bangladesh is no exception. The lack of data on cancer especially in the pediatric age group representing almost half the population of Bangladesh persuaded us to undertake this study.

Methods: A cross-sectional study has been conducted in Chittagong Medical College & Hospital (CMCH); the only tertiary hospital in Chittagong and Chattogram Ma-O-Shishu Hospital (CMOSH); the largest private hospital in Chittagong. From 3rd July to 18th July, data on 704 diagnosed cancer patients were collected. Type of cancer in respect of age & sex and Socio-demographical profile was determined.

Results: Out of 704 cancer patients, 74 (10.51%) were in pediatric age group. Male to Female ratio was 1.74:1. We found 1.35% (1) of the pediatric cancer patients were infants whereas 40.54% (30) were children and 45.95% (34) were Adolescents. Leukemia is the commonest (47.29%) pediatric malignancy followed by lymphoma (16.2%) irrespective of sex. In female, Leukemia (59.52%) & ovarian cancer (14.29%) are the most common according to our study whereas in male, Lymphoma (34.38%) and leukemia (34.37%) were the most frequently diagnosed. 8.1% (6) of our study subjects had metastasized cancer. 17.57% (13) of the patients had family history of cancer.

63.51% of the cancer patients were from rural area and 36.49% from urban area. Other than Chittagong Metropolitan (31.08%) area, 21.62% of the patients came from Cox's Bazar. 77.03% of the patients were in the income range <10,000 BDT (<119.25 USD).

Conclusion: Most of the pediatric cancer patients came from rural areas and belonged to poor income families. Family history of cancer was found in thirteen cases. Irrespective of age and sex Leukemia was the commonest type of cancer. Our study provides a gross overview of pediatric cancer status in Chittagong. Further implementation of the study can help to address the research gap in pediatric cancer.

Keywords: Cancer, Children, Malignancy, Family History

Introduction

The shifting pattern of global disease burden from infectious diseases to non-communicable diseases has been notable over the last decade.¹ Cancer, a non-communicable disease, is the second leading cause of death worldwide.² With Age standardized (ASR) incidence rate of 197.9 per 100,000 and ASR mortality rate of 101.1 per 100,000 worldwide; cancer is a substantial cause of alarm.³ Additionally, each year the numbers keep increasing. Though cancer is more common in adults, the occurrence in children is not insignificant at all. Approximately 300,000 pediatric cancer patients are diagnosed yearly with Lower Middle Income Countries (LMIC) shouldering the bulk amount of it.^{4, 5}

The scenario of Bangladesh, an LMIC is not much different with ASR incidence rate of 105.7 per 100,000 and ASR mortality rate of 77.1 per 100,000 due to cancer.⁶ 12% of total deaths in Bangladesh are attributed to cancer.⁷ A hospital based cancer registry started at National Institute of Cancer Research Hospital and Oncology Department of Bangabandhu Sheikh Mujib Medical University with the technical

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Published: March 2025

assistance of WHO since 2005 onwards.¹⁶ However, In Bangladesh a proper national cancer registry is yet to be formed and till date these registries couldn't cover the whole Country. Thus the actual scenario of cancer status in Bangladesh might be much worse than what is portrayed.

The pediatric population i.e. 0-19 age group consists 43.9% of the total population of Bangladesh.⁸ Lack of data on pediatric age group can be considered as a major blind spot on the health status of a population. However cancer data for less than half of the population of Bangladesh in the existing registry is not adequate. The lack of country-specific cancer data especially in the pediatric population persuaded us to undertake this study. In our study, we wanted to find out the scenario of pediatric cancer in Chittagong division, southern part of Bangladesh.

Methodology

A hospital based, descriptive cross-sectional study was conducted in Chittagong Medical College Hospital (CMCH) and Chattagram Maa-O-Shishu Hospital (CMOSH) from 3rd July to 18th July 2018, a total of 15 days. CMCH is the largest and the only tertiary level public hospital in the Chittagong division of Bangladesh. This 1313 bedded hospital serves a catchment area with population of approximately 30 million and is funded by the government.^{9, 10}

CMOSH is a private non-profit semi charitable hospital situated in Chittagong Metropolitan with 650 bed capacity.¹¹ Data of 704 cancer patients with confirmed diagnosis were collected from 17 Departments of CMCH and 7 Departments of CMOSH in the 15 day time frame. Among them only the patients aged 0 to 19 years were included in this study. Data was collected by face to face interview of patients and/or their legal guardians using a semi-structured questionnaire. The questionnaire included socio-demographic profile (age, sex, location, education level and occupation & monthly income of the legal guardian) and family history. The diagnosis (Tumor site group, Histological variants and Metastasis) were confirmed and recorded from the hospital records. Tumor site and histology were coded according to the 3rd edition of the International Classification of Childhood Cancer (ICCC-3). Data were analyzed by

software of Statistical Packages for Social Sciences (SPSS) version 16.

Results

74 pediatric cancer patients were identified among the 704 data. Demographic data of them showed, 56.76% female and 42.24% male patients. Age distribution displayed, 1.35% of the 74 patients were infant (28days-1year), 12.2% toddler (>1-3 years), 40.29% children (>3-10 years) and 45.95% adolescent(>10-19 years). (Table 1) The mean age of the pediatric cancer patients being 9.8 (Standard Deviation $\pm$ 5.5) and median age 9years. Age distribution according to gender showed, majority of the male patients were children (43.75%) and adolescents (43.75%). In case of females, adolescents were prominent (47.62%). (Fig 1) Majority of the cases were from rural area (63.51%) whereas 36.49% were from urban area. Highest percentage(31.08%) of the cancer patients came from Chittagong Metropolitan area followed by Cox's Bazar(21.62%), the coastal district of Bangladesh. Financial condition of majority was subpar. 77.03% of the patients came from lower income family having monthly income less than 10000 BDT (~119.2 USD). Small businessman(21.62%) followed by service holders (16.22%) were the top two professions of the legal guardians. 64 patients of the total were in school going age. Among them, 46 were literate and pursuing education at school. (Table I)

Categorizing different types of cancer according to their histopathology types we found, 35 (47.3%) patients suffering from leukemia, of which acute lymphoid leukemia was the highest (68.57%) followed by acute myeloid leukemia (28.57%). In our study, Hodgkin's lymphoma (58.33%) was more common than non-Hodgkin's lymphoma (41.67%). Among the many histopathological variants of cancer in bone we only found, Ewing's tumor & related sarcomas of bone(50%) and osteogenic sarcoma(50%) among the study population. The only histopathological type for the renal tumor was nephroblastoma. (Table II)

Sex specific frequency varied for site groups, with leukemia (59.52%) & germ cell, trophoblastic and ovarian tumor (14.29%) being more common in girls. In male, lymphoma (34.38%) and leukemia (31.25%)

Table 1 : Demographic profile of the pediatric cancer patients

Characteristics and Category	Number	Percentage
Gender		
Male	32	43.24%
Female	42	56.76%
Age		
Infant	1	1.35%
Toddler	9	12.16%
Children	30	40.54%
Adolescent	34	45.95%
Monthly Income		
<5000	27	36.49%
5000 – 10000	30	40.54%
10000 - 20000	13	17.57%
20000 – 30000	3	4.05%
30000 - 40000	1	1.35%
Area Distribution		
Rural	47	63.51%
Urban	27	36.49%
Occupation		
Small Businessman	16	21.62%
Service Holder	12	16.22%
Farmer	9	12.16%
Housemaid	6	8.11%
Unemployed	6	8.11%
Rickshaw Puller	5	6.76%
Day Laborer	4	5.41%
Garments Worker	4	5.41%
Banker	2	2.70%
Businessman	2	2.70%
Others	8	10.81%
Chittagong Metropolitan	23	31.08%
Cox'sBazar	16	21.62%
Fatikchari	5	6.76%
Bashkhali	5	6.76%
Satkaniya	5	6.76%
Patiya	4	5.41%
Ranguniya	3	4.05%
Rohingya Camp	3	4.05%
Anowara	2	2.70%
Mirsharai	2	2.70%
Noakhali	2	2.70%
Comilla	1	1.35%
Boalkhali	1	1.35%
Khagrachari	1	1.35%
Lohagara	1	1.35%
School going age		
Educated	46	71.87%
Illiterate	18	28.13%
Non School going age	10	13.51%

were the most frequently diagnosed (Fig 3). In case of lymphoma, the gender difference was more prominent (male: female=11:1). In our study, leukemia was the highest in children (45.71%), closely followed by in adolescents (34.29%). However, in regards to lymphoma, 66.67% belonged to adolescent age group while only 11.11 % among the toddlers. Furthermore, bone tumor (66.67%), germ cell tumor & tumor of gonads (85.71%) were frequent in adolescents (Table III). However, renal tumor (75%) & soft tissue tumor (60%) were mostly seen in children. Moreover, irrespective of sex and age groups, leukemia (47.3%) was the commonest type of cancer, followed by lymphoma (16.2%), germ cell tumor, trophoblastic tumor & tumor of gonad (9.5%) and tumor of bone (8.1%) (Table IV).

Among our study population we encountered 8.1% (6) patients who had metastasized cancer. Family history of cancer was seen in 17.57% of the patients. (Figure 2).

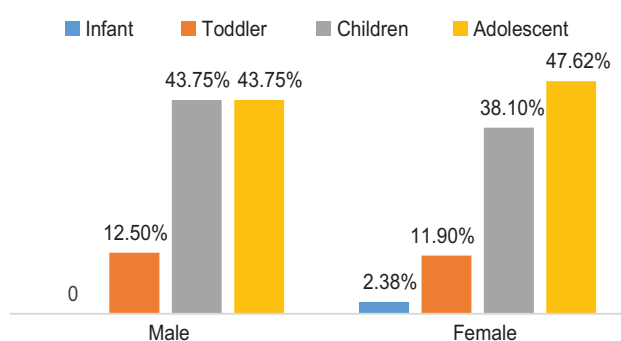
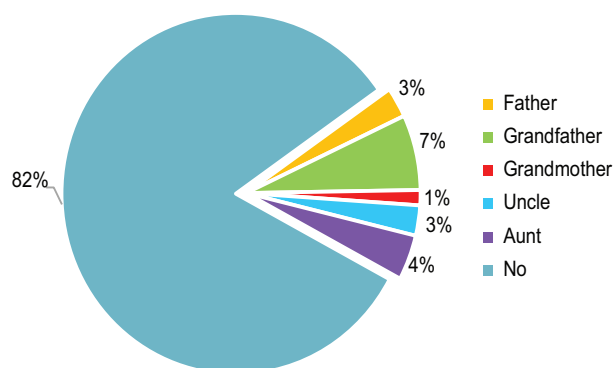
**Figure 1: Age pattern in male & female****Figure 2: Family history of Cancer patients**

Table II: Distribution of cancer according to site and histopathology type

Site Group	Histopathology Type		Number	Percentage
Leukemias	Acute Lymphoid Leukemia		24	68.57%
	Acute Myeloid Leukemia		10	28.57%
	Chronic Myeloid Leukemia		1	2.86%
	Total		35	100%
Lymphomas	Hodgkin Lymphoma		7	58.33%
	Non Hodgkin Lymphoma (except Burkitt Lymphoma)		5	41.67%
	Total		12	100%
Bone	Ewing's tumor and related sarcomas of bone		3	50%
	Osteogenic Sarcoma		3	50%
	Total		6	100%
Soft Tissue & other extra osseous sarcomas	Rhabdomyosarcoma		4	80%
	Fibrosarcoma		1	20%
	Total		5	100%
Brain	Astrocytoma		1	50%
	Intracranial Intra Spinal embryonal tumor	Primitive Neuro endocrine Tumor	1	50%
	Total		2	100%
Germ Cell tumor, Trophoblastic Tumor, Tumor of Gonad	Gonadal Carcinoma	Adenocarcinoma	1	14.29%
		Cystadenocarcinoma	1	14.29%
	Malignant Gonadal Germ Cell Tumor	Yolk Sac Tumor	1	14.29%
		Dysgerminoma	1	14.29%
		Mixed Germ Cell Tumor	1	14.29%
		Embryonic Carcinoma	1	14.29%
	Intracranial Intraspinial Germ Cell Tumor	Intracranial and Intraspinial teratoma	1	14.29%
	Total		7	100%
Renal Tumor	Nephroblastoma/ Wilm's Tumor		4	100%
	Total		4	100%
Other Malignant Epithelial Neoplasm	Thyroid Carcinomas	Papillary Carcinoma	1	50%
	Adrenocortical Carcinomas	Neuroblastoma	1	50%
	Total		2	100%
Other and unspecified carcinomas	Colon	Adenocarcinoma	1	100%
	Total		1	100%

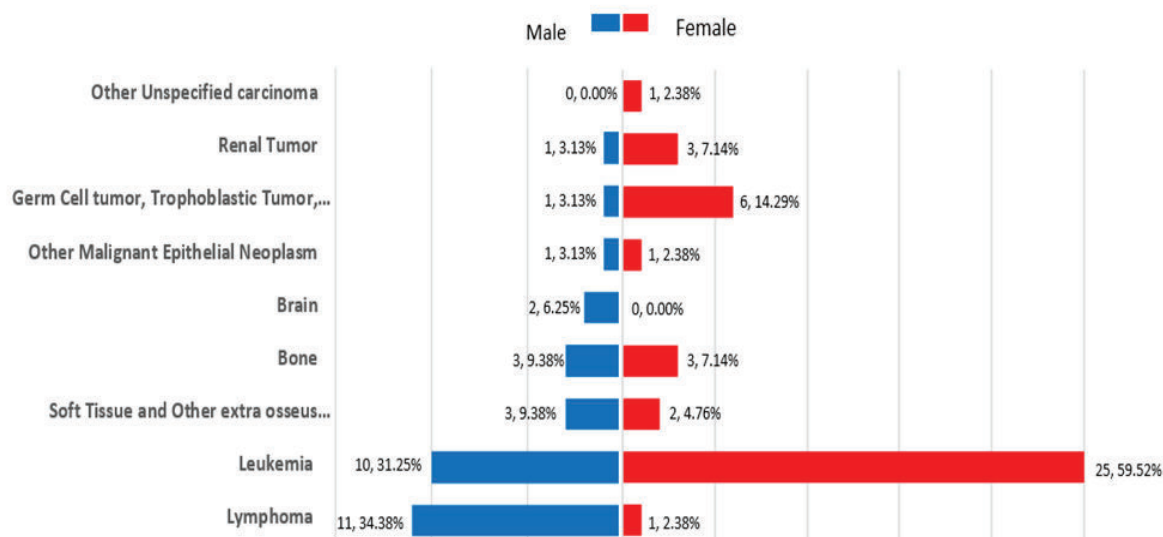


Figure 3: Cancer Frequency in Male vs Female

Table 3: Distribution of different cancer types according to age group

Age Group	Infant			Toddler			Children			Adolescent		
	No	% In Age Group	% of Site	No	% In Age Group	% of Site	No	% In Age Group	% of Site	No	% In Age Group	% of Site
Leukemia	1	100%	2.86%	6	66.67%	17.14%	16	53.33%	45.71%	12	35.29%	34.29%
Lymphoma	0	0%	0%	1	11.11%	8.33%	3	10%	25%	8	23.53%	66.67%
Bone	0	0%	0%	0	0%	0%	2	6.67%	33.33%	4	11.76%	66.67%
Soft Tissue & other extra osseous sarcomas	0	0%	0%	0	0%	0%	3	10%	60%	2	5.88%	40%
Brain	0	0%	0%	0	0%	0%	2	6.67%	100%	0	0%	0%
Germ Cell tumor, Trophoblastic Tumor, Tumor of Gonad	0	0%	0%	1	11.11%	14.29%	0	0%	0%	6	17.65%	85.71%
Renal Tumor	0	0%	0%	1	11.11%	25%	3	10%	75%	0	0%	0%
Other Malignant Epithelial Neoplasm	0	0%	0%	0	0%	0%	1	3.33%	50%	1	2.94%	50%
Other unspecified carcinomas	0	0%	0%	0	0%	0%	0	0%	0%	1	2.94%	100%

Table 4: Top Cancers irrespective of age & sex

Site Group	Number	Percentage
Leukemia	35	47.30%
Lymphoma	12	16.22%
Germ Cell Tumor, Trophoblastic Tumor, Tumor of Gonad	7	9.46%
Bone	6	8.11%
Soft Tissue & other extra osseous sarcomas	5	6.76%

Discussion

Cancer is a generic term for a large group of diseases characterized by the growth of abnormal cells beyond their usual boundaries that can then invade adjoining part of the body and/ or spread to other organs. 9.6 million People worldwide were estimated to die from cancer in 2018.¹² Similarly; cancer is a major cause of death in children in the world, the recorded incidence of which is increasing every year. In United States, childhood cancer is the number one cause of death (53%) in children.² There are about 160000 children and adolescents who are diagnosed as cancer worldwide, 80% of which belongs to low and middle income countries (LMICs). These countries have about 5% of the universal resources for treatment and control of cancer.⁵ Furthermore, only one in five low and middle income countries (LMICs) have the necessary data to drive cancer policy.¹³ Global estimation of childhood cancer incidence (0-14 years) vary from 160,000 to 240,000 cases per year due to missing of data from LMICs and differences in estimation methods.^{14, 15} There are no formally established childhood cancer registry is Bangladesh and no specific data about the incidence rate of different cancer in children. Previous study showed that, most childhood cancer patients died without a proper diagnosis and medical treatment, also more than 50% of the diagnosed cancer patients died within 5 years of diagnosis.¹⁶ Though there are no specific registries, it is estimated that the incidence of pediatric cancer in Bangladesh is about 13000 cases per year.¹⁷ Therefore, there is an urgent need to identify research priorities to find out the incidence and prevalence of different types of pediatric cancer and develop a protocol for treatment.

Previous studies showed the incidence rates were slightly higher in boys than girls that varied with age, region and diagnostic group.^{4,18} But in our study, percentage of diagnosed cancer were slightly higher in female (Male: Female = 0.76:1)

In children aged (0-14 years), the leading types of cancers were Leukemia, BNS tumor, closely followed by Non Hodgkin Lymphoma.^{3,4} Even though our finding regarding Leukemia was similar to the previous study, the following top two cancer types were lymphoma and Germ Cell tumor, trophoblastic tumor and tumor of gonads (testes and ovary).

In global compilation of pediatric cancer data, leukemia incidence (16.4 per million) in Low Income Countries (LICs) are less than that of the incidence

rate in Middle Income Countries (36.5 per million) (MICs) and High Income Countries (40.9 per million) (HICs) that probably be due to marked deficiency of diagnosis, registration and reporting of cancer found in LICs.¹⁹ Also a data from our neighboring country India showed the age specific incidence rate of Leukemia in male and female were 24.8 and 28.7 in Bangalore and 56.1 and 28.6 in New Delhi.²⁰ Whereas our study alluded 31.25% and 59.52% of male and female diagnosed with Leukemia.

According to GLOBOCAN 2018, Leukemia, Brain and Nervous System tumor, Non Hodgkin Lymphoma and Thyroid Cancers are top cancers in Female while in our study, Leukemia, Germ Cell, Trophoblastic and Tumors of Gonad (Ovarian cancer), Bone marrow and renal Tumors are more common in female of 0-19 years of age.³

In case of male, GLOBOCAN 2018 data showed Leukemia, Brain and Nervous System tumor, Non Hodgkin Lymphoma and Hodgkin Lymphoma and Testicular tumor were the common cancer. However in our study it was Lymphoma, Leukemia, Soft Tissue and extra osseous tumor, Bone tumor and Brain and nervous system tumor.³

A study done in BSMMSU (the largest specialist pediatric oncology center in Bangladesh) by Islam A et. al, in 2012 explored a relative incidence of ALL (Acute Lymphoblastic Leukemia), Non Hodgkin Lymphoma and AML (Acute Myeloblastic Leukemia) in children respectively 58%, 11% and 10%.²¹ Also another study done by Allen E J Yeoh et. al, showed ALL was 26% of all cancers and 78% of Leukemia's in patient under 15 years of age.²² However in our study, ALL was 31.09% of all cancers and 68.57% of all leukemia. Also Hodgkin Lymphoma was more common (58.33%) than Non Hodgkin Lymphoma.

Where a population based 10 years long study represented high frequency of Leukemia (36.1%) in 0-4 years and Lymphoma (22.5%) in 15-19 years of age, our study evaluated, high proportion of Children (3 to 10 years) in Leukemia and Adolescents (10 to 19 years) in Lymphoma.⁴

Moreover a 5 year study conducted in Dhaka, Bangladesh showed a similar result as us where top cancers in Adolescents were Leukemia, Lymphoma, Bone and Gonadal Cancer.²³

A study on metastatic solid tumor showed that, out of 10,938 patients 3009 patients that is about 1/3rd had

metastasis. But in our study, a small percentage of metastasized cancer (8.1%) was reported.²⁴

Previous study in Australia demonstrated 22% of cancer survivors having 1st degree and 66% having 2nd degree relatives' diagnosed with cancer, where in our study, only one-fifth (17.57%) had positive family history.²⁵

Conclusion

Demographic data indicated majority of the cancer patients hailed from rural areas and belonged to poor income families. The frequency of cancer increased with age, children and adolescents constituting the bulk number. Aside from Chittagong metropolitan area, a great number came from Cox's Bazar, a coastal area. Irrespective of age and sex majority of our patients had leukemia. In respect to gender leukemia was one of the top most cancers in both male and female, but other top cancer types varied. Lymphoma, soft tissue & other extra osseous sarcomas and bone tumors were more common in male. While germ cell tumor, trophoblastic tumor & tumor of gonad and nephroblastoma were more common in females. We observed a miniscule percentage of patients having metastasis. Family history of cancer was found in thirteen cases.

Limitations

Our sample size was not adequately large to show the real picture of cancer status in Chittagong. However, for a 15 day data collection period, the data is sufficient enough. Implementing the study in large scale is one of our future goals. Recall bias might be another limitation of this study as some data were collected by face to face interviews. Also this study might be affected by temporal bias.

Regardless of the limitations, this study gives an overview of the cancer scenario to some extent. Our finding emphasizes the need for national and regional initiatives to develop and strengthen cancer registries for knowing the actual cancer burden to give better management of the cancer patients.

Funding

This study did not receive any funding.

Acknowledgement

We are grateful to the dedicated team of doctors from Chittagong Medical College and Chattagram Maa-O-

Shishu Hospital, Chittagong, Bangladesh for their help in collection of data.

This paper was presented as poster presentation at the 12th SIOF Asia 2019 Congress held in Abu Dhabi, United Arab Emirates (3rd – 6th April 2019).

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