

## Pattern of Childhood Malignancy in a Tertiary Care Hospital

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### Abstract

**Introduction:** Cancer is a leading cause of death for children and adolescent worldwide. The cure rates in low middle-income countries are dismal (20%) in comparison to high income countries (80%). This study attempts to provide spectrum of pediatric malignancies from a tertiary care hospital in Bangladesh. **Aim:** Aim of this study is to evaluate the pattern of Childhood malignancy in a tertiary care hospital like Dhaka Medical College Hospital (DMCH). **Materials and Methods:** It is a prospective observational study was done in DMCH, over a period of 1 year (March 2014 to February 2015). After fulfilling the inclusion criteria, total 200 children aged 0-15 years were enrolled in this study. For classification of pediatric malignancies the International Classification of Childhood Cancer (ICCC), was followed. **Results:** Patients were stratified in 4 groups according to the age; 0-3 years, 3-6 years, 6-9 years and 9-12 years. Most of the patients fell in 6-9-year group (29%), followed by 3-6-year group (25%). Majority of cases, 61% were male. The male to female ratio was 1.55:1. Among 200 cases, Leukemia (49%) was the most common malignancy followed by lymphoma, CNS Tumor, Neuroblastoma, Retinoblastoma, Wilms tumor and Malignant bone tumors. Acute lymphoblastic leukemia (ALL) comprises majority (98/200) of leukemia. **Conclusion:** This study gauges the trend of pediatric malignancies in Bangladesh, which is important in the planning and evaluation of health strategies. In Bangladesh, where there is dearth of high-quality data as we lack a dedicated pediatric cancer registry, such epidemiological studies play a significant part for this small but distinguished group of patients.

**Keywords:** PHO, DMCH, ALL, AML, Neuroblastoma, Retinoblastoma, Lymphoma.

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### Introduction:

Childhood neoplasm comprises a diverse array of malignant tumors arising from disorders of genetic processes involved in control of cellular growth and development<sup>1</sup>. Childhood cancer remains the leading cause of disease-related mortality among children 1 to 14 years of age<sup>2</sup>. Pediatric cancers differ markedly from adult malignancies in both prognosis and distribution by histology and tumor site<sup>3</sup>. Childhood cancer is on rise all over the globe. Its impact on children's lives varies with its incidence, diagnosis, therapy mortality and survival at different places and times<sup>4</sup>. Each year estimated 4, 00,000 children and adolescents of 0-19 years old develop cancer<sup>5</sup>. In high income countries, where comprehensive services are generally accessible, more than 80% of children with

cancer are cured. In low- and middle income countries (LMICs), less than 30% are cured<sup>6,7</sup>. Only 29% of low-income countries report that cancer medicines are generally available to their populations compared to 96% of high-income countries<sup>8</sup>. About 580,350 are expected to die of cancer in each year (almost 1,600 people per day), and 80% of them live in developing countries<sup>9</sup>. While cancer rates in general are decreasing in the United States and many western countries, they are increasing in less developed and economically transitioning countries, including eastern European countries, because of adoption of unhealthy western lifestyles such as smoking and physical inactivity and consumption of calorie-dense food<sup>10</sup>. Prevalence of cancer burden varies in different countries in the world. Sri Lanka is our neighboring country. The pattern of cancer prevalence in Sri Lanka is such as Leukaemia-34.6%, lymphoma-19.9%, Brain tumor-9.9%, Adrenal gland tumor- 4.2%, Other and ill-defined site-4.2%, Bonetumors-3.7%, Kidney-3.7%, Eye and adnexa-3.7%, Conn tissue, subcutaneous and other soft tissue-3.1%, Thyroid gland tumor-2.1%<sup>11</sup>. The same finding is noted in India also. Acute Leukemias are the most common type of childhood cancer in India. Incidence of ALL is more common in the age group 1-4 years in both sexes. The frequency of ALL, Neuroblastoma, Wilms's tumor, Retinoblastoma and Hepatoblastoma are predominant in under 5 children. An increased frequency with age is seen in non-Hodgkin's lymphoma, Hodgkin's disease, osteosarcoma and Ewing's sarcoma. The early onset and the embryonal nature of many pediatric tumors suggest a prenatal origin<sup>12</sup>. In Bangladesh, Lymphoma (24.2%), Retinoblastoma (17.4%), and Leukemia (14.3%) were the commonly found childhood cancers among the children attended at NICRH. Other less commonly tumor found tumor were bone tumor (7.2%), Kidney tumor (6.8%), Central nervous system tumor (3.7%), Testicular tumor (3.7%) and Hepatocellular cancer (1.3%)<sup>13</sup>. In Iran, the most common cancer in children from 0-14 years old was Leukemia, Lymphoma and central nervous system tumors<sup>14</sup>. If diagnosed at an early stage and if treatment is available, most childhood cancers are highly curable. However, this advance has been restricted to people living in high-income countries<sup>15</sup>. In our country, cancer is the sixth leading cause of mortality. Bangladesh does not have a childhood cancer registry to help inform planning decisions across the country<sup>16</sup>. Childhood cancer data systems are needed to drive continuous improvements in the quality of care, and to inform policy decisions. Every hospital should have a cancer registry and should implement a standard guideline to ensure appropriate care, better follow up and outcome of the patient<sup>17</sup>.

**Materials and Methods:**

It is a prospective observational study conducted over a period of 1 year (March 2014 to February 2015) in the department of pediatric hematology and oncology (PHO) at a government

tertiary health care cancer facility of Bangladesh after obtaining permission from concerned authority. All the children aged 0-15 years admitted at the department of PHO in Dhaka Medical College Hospital (DMCH) which were diagnosed as a case of malignancy by means of peripheral blood smears and Bone marrow studies were included in this study. For classification of pediatric malignancies, the International Classification of Childhood Cancer (ICCC) was followed. Tissue biopsy or lymph node biopsy, CT scan or MRI and other relevant investigations were taken in the study.

The data were entered in an EXCEL sheet and then analyzed. Descriptive statistics for continuous variables and frequency distribution, with their percentages were calculated as required.

**Ethical Clearance:**

Written informed consent was taken from each patient. Ethical clearance was done from ethical committee of Dhaka Medical College Hospital.

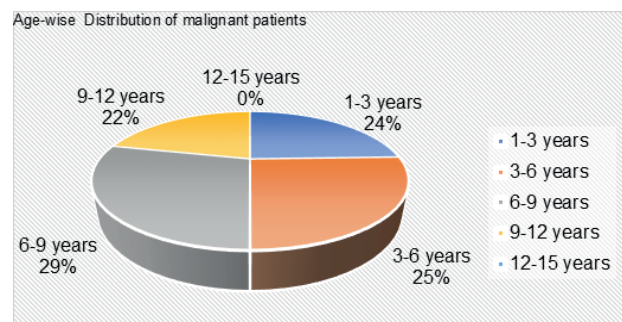
**Result:**

The data were recorded for 200 patients from age 0-15 years. Patients were stratified in five groups i.e., 0-3-year, 3-6 year, 6-9-year, 9-12 year and 12-15 year (Figure 1). Most of the patients (29%) were placed in 6-9-year group (58/200), followed by 25% (50/200) patients in 3-6-year group. There were 24% (48) and 22% (44/200) patients from age group 1-3years and 9-12 years. The mean and medium age is 10.3 years and 11 years respectively in the present study. Sex wise distribution: majority of cases, 61% (122/200) were male in comparison to 39% (78/200) were female (Figure 2). The male to female ratio is 1.55:1. Among 200 cases, Leukemia (49%) was the most common malignancy followed by Lymphoma, CNS Tumor, Neuroblastoma, Retinoblastoma, Wilm's tumor etc.

Table I shows that mean age was 6.11(±3.31) years, minimum age was 1 year and maximum age was 12 years.

**Table I: Age-wise Distribution of Childhood Malignant Patients**

Age Group	Frequency	Percent
1-3 years	48	24
3-6 years	50	25
6-9 years	58	29
9-12 years	44	22
12-15 years	00	00
Total	200	100
Mean SD	6.11 ( ±3.31)	Range 1-12



**Figure 1: Age-wise Distribution of Malignant Patients**

Figure 2 shows majority 61% were male and 39% were female. Male female ratio 1.55:1.

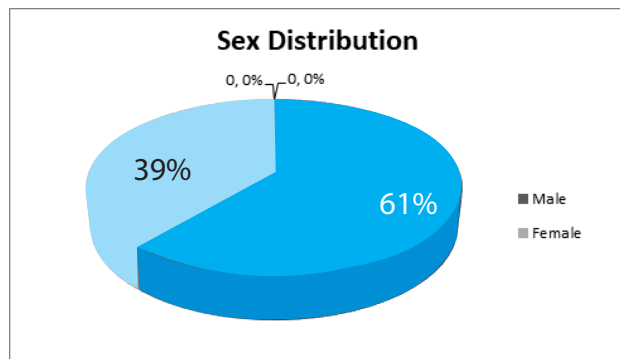


Figure 2: Sex Distribution of Study Population

Table II: Distribution of Various Cancers

Sl. No.	Type of Cancer	Total Patients	Total (%)
01	ALL	98	49
	AML	19	9.5
	CML	01	0.5
02	Hodgkin Lymphoma	09	4.5
	Non-Hodgkin	20	10
03	CNS Neoplasm	13	6.5
04	Neuroblastoma	11	5.5
05	Retinoblastoma	06	3
06	Renal Tumors (Wilms Tumor)	05	2.5
07	Osteosarcoma	04	2.0
	Ewing Sarcoma	03	1.5
08	Rhabdomyosarcoma	02	1.0
	Other STS	01	0.5
09	Soft Tissue Sarcoma	01	0.5
10	Soft Tissue Sarcoma	01	0.5

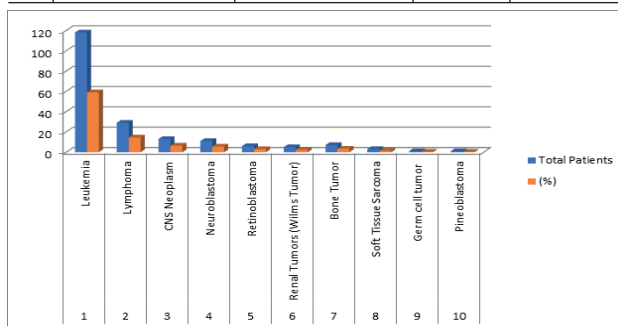


Figure 3: Distribution of Various Cancers

**Discussion:**

Malignant neoplasm remains the leading cause of disease related mortality (12.8%) among persons 1-14 years of age. To our knowledge Bangladesh has few studies about pediatric cancer profile. In many countries in the world like USA, Australia, Singapore, Switzerland has made profile about childhood cancer and they could increase the relative 5 years survival rate and improve the quality of life. This study will be

helpful to decrease the mortality and morbidity rate and improve the quality of life of children having cancer. The prospective observational study was carried out at Department of PHO, in DMCH, Dhaka. In this study common pattern of childhood malignancy were ALL, Non-Hodgkin lymphoma, AML, CNS Neoplasm, Neuroblastoma, Hodgkin lymphoma, Retinoblastoma, Wilms tumor, Germ-cell tumor, and Embryonal Rhabdomyosarcoma which were 98 (49%), 20 (10%), 19 (9.5%), 13 (6.5%), 11(5.5%), 9 (4.4%), 6 (3%), and 05 (2.5%) respectively. A review of Population based cancer registries data on Childhood cancers in India shows, top five childhood malignancy are Leukaemia, Lymphoma, CNS tumor, Retinoblastoma, and Malignant bone tumor among them Leukaemia was the most common followed by Lymphoma<sup>18,19</sup>. Childhood, adolescent and young adult cancer incidence in Japan from 2009–2011 shows that, The five leading childhood cancers were Leukemia, Lymphoma, cancer of the central nervous system (CNS), Neuroblastoma, Malignant germ cell and other Gonadal tumors in 0–14 years<sup>20</sup>. Patterns and Trends of Childhood Malignancy in Sri Lanka shows, an increase in incidence of childhood malignancy from 2.6 (in 1982) to 6.2 (in 1994) was observed. Leukaemia (42%) was the commonest malignancy of which 82. 7% of cases were Acute Lymphoblastic Leukaemia, followed by Lymphomas (12.6%) and Malignant tumors of CNS (9.7%)<sup>21</sup>. In our study, majority of cases, 61% (122/200) were male in comparison to 39% (78/200) were female (Figure 2). The male to female ratio is 1.55:1. It is almost similar to that of Indonesia where male female ratio was 1.5:1. The socio-cultural aspect could explain the male predominance, which includes prioritizing male referral to better health access, while female children tended to be neglected<sup>22</sup>. In this study, most of the patients (29%) were placed in 6–9-year group (58/200), followed by 25% (50/200) patients in 3–6-year group. This was near about same as another population-based registry study, devised by the International Agency for Research on Cancer in collaboration with the International Association of Cancer Registries, found that cancer prevalence were more common in 5-9 years age group<sup>23</sup>. A retrospective study in Nigeria in 2009 showed a relative increase of Leukemia with a relative decrease of BL over a period of 30 years<sup>24</sup>. Two other studies one in Sudan and other in Egypt have shown an increase in the frequency of Leukemia whereby in the Sudan study Leukemia (26%) was second to Lymphoma<sup>25</sup>.

**Conclusion:**

In conclusion common pattern of childhood malignancy were ALL, Non-Hodgkin lymphoma, AML, CNS Tumor, Neuroblastoma, Hodgkin lymphoma, Retinoblastoma, Wilm’s tumor, Malignant bone tumor, Embryonal Rhabdomyosarcoma, Germ cell tumor. This study gauges the trend of pediatric malignancies in Bangladesh, which is important in the planning and evaluation of health strategies. In Bangladesh, where there is dearth of high-quality data as we lack a dedicated pediatric cancer registry, such epidemiological studies play a significant part for this small but distinguished group of patients.



**Limitation:**

The present study is a single institution-based study. Small sample size and lack of follow-up served as a limitation.

**Conflict of Interest:** None.

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**References:**

- Asselin BL, Epidemiology of Childhood and Adolescent cancer. In: Kliegman RM, Staton BF, Schor NF, Geme JW III and Behrman RE. Nelson Text Book of Pediatrics. 19th edition. ELSEVIER: India Private Limited New Delhi; 2011:1725. <https://doi.org/10.1016/B978-1-4377-0755-7.00485-1>
- Scheuer ME, Bondy ML, Gurney JG. Epidemiology of Childhood Cancer. In: Pizzo PA, Popack DG editors. Principle and Practice of Pediatric Oncology. 6th ed. Philadelphia: Lipincott Williams & Wikins; 2011: p.2-16.
- Silverberg E, Aura JA. Cancer Statistics. CA cancer J Clin. 1998;38: 5-22. <https://doi.org/10.3322/canjclin.38.1.5> PMID:3123025
- Stiller CA Bunch KJ Trends in survival for childhood cancer in Britain diagnosed 1971-85. Br. J cancer 1990;62:806-815. <https://doi.org/10.1038/bjc.1990.383> PMID:2173943 PMCID:PMC1971530
- Steliarova-Foucher E, Colombet M, Ries LA, Moreno F, Dolya A, Bray F, et al. International incidence of childhood cancer. 2001-10: a population-based registry study. The Lancet Oncology. 2017 Jun 1;18(6):719-31.
- World Health Organization. CureAll framework: WHO global initiative for childhood cancer: increasing access, advancing quality, saving lives.
- Lam CG, Howard SC, Bouffet E, Pritchard-Jones K. Science and health for all children with cancer. Science. 2019 Mar 15;363(6432):1182-6. <https://doi.org/10.1126/science.aaw4892> PMID:30872518
- World Health Organization. Assessing national capacity for the prevention and control of noncommunicable diseases: report of the 2019 global survey.
- Global cancer facts and statistics 2008. American Cancer Society, 2008:3. [www.cancer.org/cancer\\_factsfigures-2008](http://www.cancer.org/cancer_factsfigures-2008) [Accessed on January 14,2014.]
- Barr R, Riberio R, Agarwal B, Masera G, Hesseling P, Megrath I. Pediatric Oncology in countries with limited resources. In: Pizzo PA, Popack DG eds. Principle and Practice of Pediatric Oncology. 5th ed. Philadelphia: Lipincott Williams & wikins; 2006. P. 1605-17.
- KarunaratneKanishka. Sri Lanka: Cancer prevalence and achievements. Available at <http://www.ihm.moh.gov.my/kmc/-maintdoc/1964/Dr.%20>
- Kushuma Kumary P, Jacob Rojimon, Jthirmayi Rema, Nair MK. Profile of Pediatric malignancies: A ten-year study. J India Pediatrics. 2000; 37:1234-1238.
- Jabeen S, Haque M, Islam MJ, Talukder MH. Profile of Pediatric Malignancies: A Five-Year Study. J Dhaka Medical College. 2010; 1(1):01.
- Mousavi SM, Pourfeizi Abbasali and Dastgiri Saeid. Childhood Cancer in Iran. J Pediatr Hematol Oncol. 2010; 32:376-382. <https://doi.org/10.1097/MPH.0b013e3181e003f7> PMID:20588194
- Reberio RC, Steliarova-Foucher E, Magrath I. Baseline status of pediatric oncology care in 10 low- or middle-income countries receiving "My Child Matters" support: a descriptive study. Lancet Oncology. 2008; 721-9. [https://doi.org/10.1016/S1470-2045\(08\)70194-3](https://doi.org/10.1016/S1470-2045(08)70194-3) PMID:18672210
- National Cancer Control Strategy and Plan of Action 2009-2015, Ministry of Health and Family Welfare, Bangladesh, CMOHFW; 2008:17.
- Strome G. Clinical Practical Guidelines in cancer; The European Perspective. Br j cancer. 2001; 84 (Supple 2):6-7. <https://doi.org/10.1054/bjoc.2000.1773> PMID:11355961 PMCID:PMC2408837
- Bashar MA, Begam N. Trend of Childhood cancers in India: A review of Population based cancer registries data on Childhood cancers. European Journal of Cancer Prevention. 2021 Dec 1;31:S7-8. <https://doi.org/10.1097/01.cej.0000816672.18030.22>
- Digumarti R, Koyyala VP. Patterns of Care of Childhood Cancers in India. In CNS Malignancies. 2021 Mar 16. IntechOpen. <https://doi.org/10.5772/intechopen.96709> PMCID:PMC9363457
- Katanoda K, Shibata A, Matsuda T, Hori M, Nakata K, Narita Y, et al. Childhood, adolescent and young adult cancer incidence in Japan in 2009-2011. Japanese Journal of Clinical Oncology. 2017 Aug 1;47(8):762-71. <https://doi.org/10.1093/jjco/hyx070> PMID:28541571 PMCID:PMC5896699
- De Silva GL, Seneviratne RD. Patterns and Trends of Childhood Malignancy in Sri Lanka. Journal of the College of Community Physicians of Sri Lanka. 1997 Dec 31;2(1). <https://doi.org/10.4038/jccpsl.v2i1.8493>
- Veeraman AJ, Armytasari I, Ritter J, Widjajanto P. 10-Year-Childhood Malignancy Profile Province-Wide in Indonesia (2009-2018): Yogyakarta Pediatric Cancer Registry. Authorea Preprints. 2022 Oct 14. <https://doi.org/10.22541/au.166574345.58282938/v1>
- Steliarova-Foucher E, Colombet M, Ries LA, Moreno F, Dolya A. International incidence of childhood cancer, 2001-10: a population-based registry study. Lancet Oncol. 2017; 1-13.
- Akang EE. Tumors of childhood in Ibadan, Nigeria (1973-1990). Pediatric Pathology & Laboratory Medicine. 1996 Jan 1;16(5):791-800. <https://doi.org/10.1080/15513819609169305>
- Mostert S, Arora RS, Arreola M. Abandonment of Treatment for Childhood cancer: position statement of a SIOPODC Working Group. Lancet Oncol. 2011; 12:719-720. [https://doi.org/10.1016/S1470-2045\(11\)70128-0](https://doi.org/10.1016/S1470-2045(11)70128-0) PMID:21719348