

Original article

**Attributes of Childhood Cancer among the Patients
Attending Specialized Hospitals in Bangladesh**

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Abstract:

Background: Childhood cancer is an emerging health problem worldwide. It is the second common cause of child death. Epidemiological and clinical attributes of childhood cancer are not properly documented in Bangladesh. This study was designed to reveal the attributes of childhood cancer among the patients attended specialized hospitals in Dhaka city. **Objective:** To determine the epidemiological and clinical attributes of childhood cancer. **Materials and Methods:** The cross-sectional study was conducted among 99 under 18 years old children suffering from cancer, who were included considering specific selection criteria. Data were collected by face to face interview using a semi-structured questionnaire with the help of a semi-structured questionnaire and checklist. Data were analyzed by using SPSS software. **Results:** Of all the children, majority (40.4%) was in age group of 6-10 years and their mean (\pm SD) age was 7.48 (\pm 3.70) years. Male to female ratio was 1.9:1.6 and majority (48.5%) was in middle income group. Major part (42.4%) of the children was from sub-urban followed by 30.3% rural and 27.2% from urban communities. Major types of childhood cancer comprised acute lymphoblastic leukaemia (37.4%), retinoblastoma (14.1%), neuroblastoma (10.1%), and Wilm's tumour (10.1%). Less common cancers included non-Hodgkin's lymphoma (7.1%), Hodgkin's lymphoma (5.1%), osteosarcoma (5.1%), nasopharyngeal carcinoma (4.0%), germ cell tumour (3.0%), acute myeloid leukaemia (3.0%) and Ewing's tumour (1.0%). Majority (35.1%) of acute lymphoblastic leukaemia patients were from urban while most (85.7%) of retinoblastoma patients from sub-urban, 50.0% of neuroblastoma cases from rural, and 40.0% of Wilm's tumour from sub-urban communities, this geographical variation of childhood cancer was statistically significant [$\chi^2(33)=56.46, p=0.01$]. In poor and middle income group, most of the children (91.8%) were detected in stage II while among the higher income group, most (88.9%) of the cancer were detected in stage-I and this variation was statistically significant [$\chi^2(9)=16.77, p=0.05$]. Family history was strongly related with childhood cancer [$\chi^2(20)=32.81, p=0.04$]. **Conclusion:** Cancer was more prevalent among male children with poor socio-economic condition residing in sub-urban communities. The study recommends specific measures to detect childhood cancer and related risk factors at early stage to prevention and control.

Keywords: childhood cancer; clinical attributes; epidemiological feature

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Introduction:

Cancer may be defined as a group of diseases characterized by an abnormal growth of cells, ability to invade adjacent tissues and even distant organs, the eventual death of the affected patient if the tumor has progressed beyond that stage when it can be successfully removed¹. Childhood cancer is a rising problem of the world. World wide it is the second

common cause of child death. The total incidence of childhood cancer varies rather little between different regions of the world, with cumulative risk to age 15 nearly always in the range 1.0—2.5 per thousand². About 6% childhood deaths are due to cancer. Eighty percent (80%) of the children with leukaemia and cancer live in poor and developing countries. In these countries about 60% children die

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in cancer. Many of them are never diagnosed at all. If diagnosed treatment option is also limited². In India 1.6% to 4.8% of all cancer is seen in children below 15 years of age and the overall incidence of 38 to 124 per million per year.

About 7000-9000 cases of childhood cancer occur every year in our country, but less than 500 of them receive treatment.³ About 1 in every 600 children develops cancer before they reach the age 15 and there is a marked peak in incidence at age 2 to 3 years⁴. A retrospective study conducted in the department of radiotherapy, Chittagong Medical College Hospital and found 2958 cancer patients of pediatric age group attended the radiotherapy out-patient department and the commonest malignancies were Non Hodgekin's lymphoma (23.34%), followed by bone tumor (22.22%), retinoblastoma (20.00%). This study identified the clinical types and staging with grading common in our country. It also ascertained the epidemiological distribution and proportion of childhood cancer and possible risk factors of childhood cancer in our country which will be helpful for early diagnosis of cancer. In our country childhood cancer is not identified early due to poverty and lack of knowledge and awareness of people. This study explored the attributes and risk factors of childhood cancer which thus help the policy maker to make policy to prevent childhood cancer to reduce the burden of cancer.

Materials and Methods:

This descriptive type of cross sectional study was conducted throughout six months (January to June 2011) to determine the attributes of childhood cancer patients attending specialized hospitals. The children were selected from Haematology

and Paediatric Oncology Department of National Institute of Cancer Research & Hospital (NICRH) and Haematology&Paediatric Oncology Department of Bangabandhu Sheikh Mujib Medical University (BSMMU) Dhaka. Children suffering from cancer aged from 1-18 years were included conveniently. Data were collected by face-to-face interview with the help of a semi-structured questionnaire and check list. Data were cleaned and processed by editing, coding and categorizing.

Statistical Analysis

Data analysis was done by using the SPSS software and accordingly descriptive statistics included mean, standard deviation and frequency distribution while inferential statistics included Chi square test to determine the association. A 'p' value of <0.05 was considered statistically significant at 95% CI.

Ethic

Ethical clearance was taken from the ethical committee of NIPSOM. Valid and informed consent was taken from the legal guardian after describing the objectives and procedure of the study. During data collection, privacy and confidentiality were maintained strictly. After collection, data were kept confidential in computer and used only in this particular study.

Results

It was found that majority (40.4%) of the children was in 6-10 years age group and males were predominant (55.6%). Majority (85.9%) was Muslim, 42.4% came from sub-urban area and 45.5% lived in pucca house. Majority (51.5%) of the mothers was housewives and 26.3% had primary level of education and The

Table-1: Socio-demographic attributes of the patients

Attributes	Findings
Age (in years)	2 -5: 36.4%, 6-10: 40.4%, 11-15: 23.2%, Mean (±SD)Age 7 study exposed the socio-demographic profile of children suffering from childhood cancer and it.48±3.70 years
Sex	Male: 55.6%%, Female: 44.4%%
Religion	Islam: 86%, Hindu: 12%, Buddhist: 2%
Residence	Urban: 24.2%, Sub-urban: 42.4%, Rural: 30.3%, Slum: 3%
Educational qualification of mother	Primary: 26.3%, Secondary: 16.2%, SSC: 26.3%, HSC: 16.2%, Graduate: 15.2%
Occupation of mother	House wife: 52%, Service: 40%, Day labor: 8%
Monthly family income (TK)	TK.7000-10,000:25.3%, TK.10,001-20,000:48.5%, TK>30,001-40,000: 17.2%, TK.40,001-60,000: 9.15% . Average (±SD) income 19556 (± 13237)
Housing condition	Pucca: 45.5%, Semi-pucca: 39.4%, Katcha: 14.1%, Wooden: 1%

majority (48.5%) were from middle income group (TK.10,001-20,000) (Table-1).

Common childhood cancers included ALL (37.4%), retinoblastoma (14.1%), neuroblastoma (10.1%), wilm's tumour (10.1%) and Ewing's tumour (1.0%) (Table-2).

Table-2: Distribution of the children by types of cancer

Type of Cancer	Frequency	Percent
Retinoblastoma	14	14.1
ALL	37	37.4
Wilm's Tumour	10	10.1
Hodgkin's Lymphoma	5	5.1
Neuroblastoma	10	10.1
NHL	7	7.1
Ewings Tumour	01	1.0

Regarding clinical attributes, majority (51.5%) of the children were in grade-I, 47.5% in grade-II and the rest 1.0% were in grade-III (Figure-1).

Out of all the children, 45.5% were in stage-I, 39.4% in stage-II, 8.1% in stage-III and the rest 1.0% was in stage-IV (Table- 3).

Table-3: Distribution of the children by staging of cancer

Stage of cancer	Frequency	Percent
Stage-I	45	45.5
Stage-II	39	39.4
Stage-III	8	8.1
Stage-IV	7	7.1
Total	99	100.0

Most (84.8%) of the children had no family history and 45.5% cancer were first detected in specialized hospital, 33.3% in government hospital, 19.2% in the

chamber of specialist doctors and the rest 2.0% cancer were first detected in private hospitals (Table-4).

Table-4: Distribution of the children by place of first detection of cancer

Place of first detection	Frequency	Percent
Government General Hospital	33	33.3
Private Hospital	2	2.0
Specialized Hospital	45	45.5
Chamber of Specialist Doctor	19	19.2
Total	99	100.0

Majority (67.7%) of the children was first treated in specialized hospitals, 30.3% in government hospitals and the rest 2.0% by homeopathic doctor (Figure-2).

Majority (71.4%) of retinoblastoma was found among 2-5 years while majority (43.2%) of ALL was found among 6-10 years old children. On the other hand, majority (50.0%) of wilm's tumour was found among 2-5 years and 60.0% of neuroblastoma was found among 2-5 years old children (Table-5). These differences in distribution of childhood cancer by age was statistically significant [$\chi^2_{(22)}=38.36, p=0.02$].

It was found that 50% childhood cancer with stage-II and 30.8% with stage-I were found among the children of the mothers having primary level education. On the contrary, 50% cancer with stage-I and 43.7% with stage-II were detected among children of the mothers having higher secondary level education. In case of graduate mothers, 80% children were in stage-I, 20% were in stage-II. These differences of cancer staging by mother's education was statistically significant [$\chi^2_{(12)}=20.91, p=0.05$] (Table-6).

The study revealed the association between housing condition and staging of the cancer. 57.1% cancer

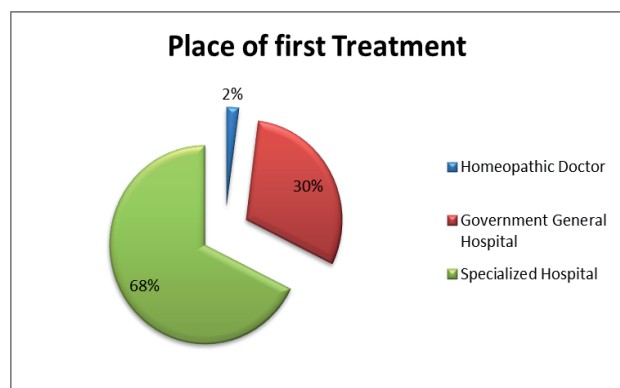


Figure -1: Distribution of the children by grading of the cancer

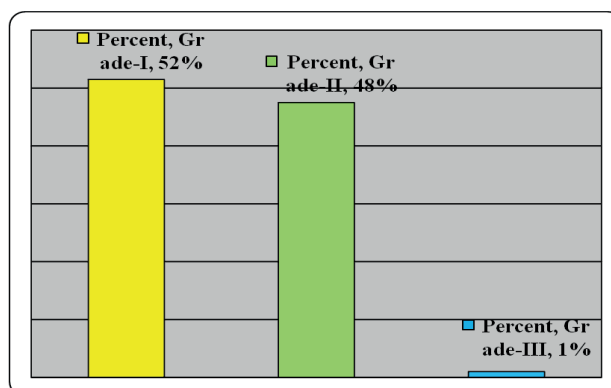


Figure-2: Place of first treatment

with stage II and 35.7% cancer with stage I found in children living in katcha house and 64.4% cancer with stage I and 28.9% cancer with stage II in children living in pucca house. On the other hand among the semi-pucca houses majority i.e. 46.2% cases were in stage II, then 28.2% were in stage I and this difference in staging of the cancer by housing condition was statistically significant [$\chi^2_{(9)} = 28.54, p=0.001$]. Majority (75.0%) of the nasopharyngeal cancer patients were from sub-urban area while most (85.7%) of the retinoblastoma patients were from sub-urban area. Each 35.1% of ALL patients were from urban and rural areas while each 40% of Wilm's Tumour, patients were from urban and sub-

Table-5: Association between types of childhood cancer and age of the patient

Types of Cancer	Age Group (years)			Total (%)
	2-5 (%)	6-10 (%)	11-15 (%)	
Nasopharyngeal	2(50.0)	2(50.0)	0(0.0)	4(100.0)
Retinoblastoma	10(71.4)	3(21.4)	1(7.1)	14(100.0)
Germ Cell Tumour	0(0)	1(33.3)	2(66.7)	3(100.0)
ALL	8(21.6)	16(43.2)	13(35.1)	37(100.0)
Wilm's Tumour	5(50.0)	4(40.0)	1(10.0)	10(100.0)
HL	2(40.0)	3(60.0)	0(0)	5(100.0)
Neuroblastoma	6(60.0)	3(30.0)	1(10.0)	10(100.0)
Osteosarcoma	0(0)	2(40.0)	3(60.0)	5(100.0)
Ewings Tumour	0(0)	1(100.0)	0(0)	1(100.0)
AML	0(0)	1(33.3)	2(66.7)	3(100.0)
NHL	3(42.9)	4(57.1)	0(0.0)	7(100.0)
Total	36(36.4)	40(40.4)	23(23.2)	99(100.0)
Significance	χ^2 test, Value: 38.36, df: 22, p-value: 0.02			

Table-6: Association between mother's education and stage of cancer

Education	Staging of the Cancer				Total (%)
	Stage-I (%)	Stage-II (%)	Stage-III (%)	Stage-IV (%)	
Primary	8(30.8)	13(50.0)	3(11.5)	2(7.7)	26(100.0)
Secondary	7(43.8)	4(25.0)	1(6.3)	4(25.0)	16(100.0)
SSC	10(38.5)	12(46.2)	3(11.5)	1(3.8)	26(100.0)
HSC	8(50.0)	7(43.7)	1(6.3)	0(0)	16(100.0)
Graduate	12(80.0)	3(20.0)	0(0)	0(0)	15(100.0)
Total	45(45.5)	39(39.4)	8(8.1)	7(7.1)	99(100.0)
Significance	χ^2 test, Value 20.91, df: 12, p-value: 0.05				

urban areas. In case of Hodgekin's Lymphoma majority (60%) of the patients were from sub-urban and 50% of Neuroblastoma patients were from rural area. Each 42.9% of the NHL patients were from sub-

urban and rural areas (Table-8) and this difference in distribution of childhood cancer by geographical location was statistically significant [$\chi^2_{(33)} = 56.46, p = 0.01$].

Table-7: Association between housing condition and stage of the cancer

Housing Condition	Staging of the Cancer				Total f(%)
	Stage-I f(%)	Stage-II f(%)	Stage-III f(%)	Stage-IV f(%)	
Katcha	5(35.7)	8(57.1)	1(7.1)	0(0)	14(100.0)
Pucca	29(64.4)	13(28.9)	2(4.4)	1(2.2)	45(100.0)
Semi-pucca	11(28.2)	18(46.2)	5(12.8)	5(12.8)	39(100.0)
Made of wood	0(0)	0(0)	0(0)	1(0)	1(100.0)
Total	45(45.5)	39(39.4)	8(8.1)	7(7.1)	99(100.0)
Significance	χ^2 test, Value 28.54, df: 9, p-value: 0.001				

Table-8: Association between childhood cancers and residing place of the children

Types of Childhood cancer	Place of residence of the patient				
	Urban	Sub-urban	Rural	Slum	Total
	F (%)	F (%)	F (%)	F (%)	F (%)
Nasopharyngeal	0 (0)	3(75.0)	1(25.0)	0 (0)	4(100.0)
Retinoblastoma	0 (0)	12(85.7)	2(14.3)	0 (0)	14(100.0)
Germ Cell Tumour	2(66.7)	0 (0)	0 (0)	1(33.3)	3 (100.0)
ALL	13(35.1)	11(29.7)	13(35.1)	0 (0)	37(100.0)
Wilm's Tumour	4(40.0)	4(40.0)	1(12.5)	1(12.5)	10(100.0)
Hodgkin's Lymphoma	2(40.0)	3(60.0)	0(0.0)	0(0.0)	5(100.0)
Neuroblastoma	1(10.0)	3(30.0)	5(50.0)	1(10.0)	10(100.0)
NHL	1(14.3)	3(42.9)	3(42.9)	0(0.0)	7(100.0)
Osteosarcoma	0(0.0)	1(20.0)	4(80.0)	0(0.0)	5(100.0)
Ewings Tumour	0(0.0)	1(100.0)	0(0.0)	0(0.0)	1(100.0)
AML	2(66.7)	0(0.0)	1(33.3)	0(0.0)	3(100.0)
Total	24(24.2)	42(42.4)	30(30.3)	3 (3.0)	99(100.0)
Significance	χ^2 test, Value: 56.46, df: 33, p-value: 0.01				

Discussion

The study estimated the mean (\pm SD) age of childhood cancer was 7.48(\pm 3.70) years. This figure was different from the findings of a study conducted by NICRH⁵ where majority of the patients belonged to 10- 14 years age group and this difference may be due to small sample size and short study period. Here male to female ratio was 1.9: 1.6. It was almost similar to the study findings conducted by NICRH² where the male: female ratio was 1.6:1. The cause of male predominance may be due to social customs and culture. Male child are given priority than female. Maximum patients (42.4%) came from sub-urban area then rural (30.3%), urban (24.2%) and slum (3%). Other study by NICRH⁵ showed that most of the children with cancer came from the rural areas (67%) compared to 33% from urban areas and such difference may be due to their large sample size. Housing condition of the patient showed that, 45.5% patients lived in pucca house, 39.4% in semi-pucca house and other percentage in katcha house.

Educational qualification of Parents of the patient was considered and it was found that majority of the mother who had primary level of education, majority of their children i.e. 50.0% were detected at stage II. Another 26.3% were SSC passed, majority of their children i.e. 38.5% were detected at stage-I while 15% mothers were graduate and majority of their children i.e. 80.0% were detected at stage-I. Educational qualification of mother in association

with childhood cancer was statistically significant [$\chi^2_{(12)}=20.906$, $p=0.052$]. Poor awareness may be a cause in occurrence of childhood cancer and this may be due to lack of knowledge and poor education of the mothers.

It was found that majority of the patients i.e. 48.5% came from middle income group (10,001-20,000 taka), Other study by NICRH⁵ showed that majority of the children with cancer came from poor income group. Poverty is one of the major causes of late detection of cancer along with its delayed treatment and follow-up. The variation occurred as we took only diagnosed and admitted patients in the hospitals and not the out door patients who could not bear the treatment cost.

The study showed that, most commonly occurring childhood cancers were ALL (37.4%), Retinoblastoma (14.1%), Neuroblastoma (10.1%), Wilm's tumour (10.1%), Non-hodgkin's lymphoma (7.1%), then Hodgkin's lymphoma, Osteosarcoma, Nasopharyngeal carcinoma, Germ cell tumour, AML, Ewing's tumour. This figure was different from the findings of a study conducted by NICRH⁵ where the most common childhood cancers were Lymphoma (24.4%), Retinoblastoma (17.4%), Leukaemia (14.3%) and then Osteosarcoma (7.2%), Wilm's tumour (6.8%), CNS tumour (3.7%) and others. This difference might be due to variation of the study places. In this study majority i.e. (51.5%) patients were in Grade-I, only 1% in Grade-III and

in case of staging most of the patients (45.5%) were in stage-I then stage-II (39.4%), stage III and IV, because cancer was not detected in early stage.

Among all the respondents most (42.4%) cancers occurred when the mothers were in 21-25 years at child birth then 33.3% at 17-20 years age group and mean age was 23.24(±3.89) years and this was statistically significant [$\chi^2_{(33)}=56.607$, $p=0.006$]. In another study conducted in Institute of Social and Preventive Medicine, University of Bern, Bern, Switzerland⁶ found mothers with 20-24 years age group had higher risk of ALL in their offspring which is similar to this study.

Children suffering from childhood cancer majority 45.5% lived in pucca house. Among those who lived in pucca house, 64.4% patients were in stage-I. Among those who lived in semi-pucca house, 46.2% were in stage-II. Out of those who lived in katcha house, 57.1% were in stage-II, 35.7% in stage I and others in stage III and the association between housing condition and staging of cancer is statistically significant [$\chi^2_{(9)}=28.536$, $p=0.001$]. This was because; housing materials might be a risk factor for childhood cancer.

It was found that, most (84.8%) of the patients had no family history. Out of 15.2% patients who had positive family history, inherit from uncle, aunt, father and grand father, sister and from cousins. This difference

was statistically significant [$\chi^2_{(20)}=32.813$, $p=0.035$]. Again birth characteristics i.e. birth order showed that 57.6% children were first child of parents, 36.4% were second child and the rest were third child of parents. This finding had a similarity with another study conducted by Spector Logan G, Davies Stella M in USA⁷.

In radiation exposure only 16.2% gave positive history and 83.8% did not. This finding was not statistically significant in this study. The cause may be due to small sample size and the sources which may actively cause cancer (such as nuclear power plant) were not available here. But the finding was similar to another study conducted by Childhood Cancer Research Group, University of Oxford⁸.

These findings might not reveal the true picture regarding attributes of childhood cancer and might not be able to identify all risk factors responsible for childhood cancer. The study recommends some specific policy and strategies like cancer surveillance, cancer registration, effective vaccination to prevent infection should be ensured throughout the country for early detection, prompt treatment of childhood cancer, education among the mothers of rural and sub urban area to raise the awareness of the people regarding childhood cancer and its risk factors and also to reduce the disease burden in the country.

Conflict of interest: None

References

1. Park. K. Park's Textbook of Preventive and Social Medicine, M/s Banarsidas Bhanot, 1167, Prem Nagar, Jabalpur, 482001, India, 2009; 20th Edition: 332
2. Parkin DM, Stiller CA. Geographic and ethnic variations in the incidence of childhood cancer. *British Medical Bulletin* 1996; **52** (2): 682-703.
3. URL: www.the.net/newdesign/news-details.php?nid=12603 accessed at 13th March 2010.
4. URL: www.thedailystar.net/newdesign/news-details.php?nid=12603 accessed at 13th February 2010.
5. Jabeen S, Haque M, Islam MJ, Talukder MH, NICRH, Profile of Paediatric Malignancies: A Five Year Study, *J Dhaka Med Coll* 2010; **19**(1): 33-38.
6. Known and probable human carcinogen, American Cancer Society, 1-800-227-2345 accessed at <http://www.ircac.fr> on April, 2011.
7. Kate Davis. Economic Cost of Childhood Disease and Disabilities Attributable to Environmental Contaminants in Washington State. USA *Ecohealth J Consordum* 2006; **3**:86-94.
8. Spector GL, Davies SM, Robison LL. Birth Characteristics, Maternal Reproductive History and the Risk of Infant Leukaemia: A report from children's oncology group. *Cancer Epidemiology, Biomarker and Prevention* 2007; **16**: 128.