

Spectrum of pediatric malignancy- A cancer hospital-based study

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Objective: Childhood malignancy being a significant cause of mortality among children. The aim of the study is to find out the epidemiology of tumours in children in our region below <14 years age who presented to tertiary care Cancer hospital, Bhopal, M.P. for period of four years (2015- 2018).

Methodology: All children with cancer, aged 1-14 years diagnosed by mean of histological and cytological examination during a period of 4 years were reviewed. **Results:** During the period of four years 275 patients were diagnosed as having paediatric malignancies. According to year wise distribution highest incidence of cases were found in 2016 (32.72%). The highest number of cases, 96(35%) were in 10-14 years of age group and mean age was 7.43 with SD 4.0. Male were affected more than females with ratio of 2.66:1. It was observed that haematological malignancies were more common 172(62.54%) than the non haematological malignancies 103(37.45%). Leukemia 150 (54.54%) is most common pediatric cancer amongst which Acute lymphoblastic leukemia is most common haematological malignancy. Overall, it was found that most common cancer group in the present study were leukemia (54%) followed by lymphoma (8.36%), Brain tumours (7.27%) and Sarcoma (7.27%). **Conclusion:** Although the exact incidence rate cannot be provided by this hospital-based study, the information is useful in showing distribution patterns of childhood malignancy in this region.

Keywords: Childhood, Paediatric Malignancy, Tumours, Spectrum

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Introduction

Cancer in children can occur anywhere in the body, including the blood and lymph node, brain, spinal cord, kidney and other organs and tissue, Cancer begins when healthy cell change and grow out of control. In most type of cancer, these cells form a mass called a tumour. A tumour can be cancerous or benign. A cancerous tumour is malignant, meaning it can grow and spread to other part of the body. Tumors that occurs in children are as diverse as those in adult and present a number of challenges for pathologist [1].

Compared with cancers that occur in adult, childhood cancers are rare comprising only 1% of all the cancers [2]. More than 10% of all death in children below 15-years of age are caused by malignant diseases in the developed countries. In the developing world, cancers are yet to be recognized as a major pediatric illness, however they are fast emerging as a distinct entity to be dealt upon [3].

Cancer is leading cause of death for children and adolescents around the world and approximately 300,000 children aged 0-15 years old are diagnosed with cancer each year [4]. Childhood malignancy being a significant cause of death among children. The aim of the study is to find out the spectrum of childhood (<14 years) cancers in patients who presented to Jawaharlal Nehru Cancer hospital, Bhopal, M.P. for period of four years (2015- 2018).

Material and Method

Setting: This study was done in tertiary care Cancer hospital, Bhopal. M.P.

Duration: In this study four years data was collected from January 2015 to December 2018.

Type study: A cancer hospital based retrospective study.

Inclusion criteria: All children with cancer, aged 1-14 years diagnosed by mean of histological and cytological examination during four years period in **JNCH** (Jawaharlal Nehru Cancer Hospital), Bhopal were included in the study.

Exclusion criteria: All suspected cases but not confirmed pathologically.

Scoring system: The present study have followed **ICCC** (International childhood cancer classification) to classify the tumours.

In this retrospective study, four years of hospital records were used from January 2015 to December 2018. All children with cancer, aged 1-14 years diagnosed by mean of histological and cytological examination during that period in tertiary care hospital at Bhopal were included in the study. Patient from all over M.P. and Chhattisgarh and adjoining states attend this hospital for better cancer care and cure. Data was analyzed according to age, sex, and histopathological and cytological basis. All tumours were diagnosed on routine hematoxylin and eosin stained section; special stain and immunohistochemistry was applied wherever necessary. Fine needle aspiration cytology was done in some cases only. For the diagnosis of leukemia, complete blood count with peripheral smear examination, bone marrow aspiration and biopsy, flow cytometry was done to confirm the diagnosis. For children, the (International childhood cancer classification) was used based on morphology of the tumours and is composed of 12 main groups.

Result

During the period of four years 275 patients were diagnosed as having paediatric malignancies. According to year wise distribution highest incidence of cases were found in 2016(32.72%) followed by 2017 (29.45%), 2015 (25.45%), 2018(12.36%) (Table 1)

Table-1: Years wise distribution of childhood cancer.

Years	Number	%
2015	70	25.45
2016	90	32.72
2017	81	29.45
2018	34	12.36

Tumours were arranged according to their age wise incidence in 1-4 years 84(30.5%), 5-9years95(34.54%), 10-14 years 96 (35%). The highest incidence was seen in 10-14years of age group and lowest in 1-4 years of age group

Table-2: Age wise distribution of childhood cancer.

1-year to 4 year	84(30.50%)
5-year to 9 year	95(34.54%)
10-year to14 year	96(35%)

Mean age 7.43 with SD 4.09

It was found that 200 (72.72%) Males were affected and 75(27.27%) Female.

In the present study, it was found that the male were affected more than females a ratio of 2.66:1 (Table 3)

Table-3: Sex wise distribution of cases.

Sex	Number
Male	200(72.72%)
Female	75(27.27%)

Male / female ratio 2.66

It was observed that haematological malignancies were more common 172 (62.54%) than the non-haematological malignancies 103 (37.45%). Leukemia 150 (54.54%) is most common pediatric cancer amongst which Acute lymphoblastic leukemia is most common haematological malignancy. It accounts for 122 (44.36%) of total malignancies and 71% of total haematological malignancies. Amongst haematological malignancies ALL is followed by AML 23(8.36%), Non-Hodgkins Lymphoma 17 (6.18%) and Hodgkin`s Lymphoma 6 (2.18%) CML 5 (1.81%). Most common Non haematological malignancy is Sarcoma 20 (7.27%) and Brain tumours 20 (7.27%) followed by Osteosarcoma 8 (2.90%) Neuroblastoma 8 (2.90%), Retinoblastoma 8 (2.90%) Wilm`s tumours 6 (2.18%)

Table-4: Distribution of childhood cancer according to type and age (years).

TYPE	Total	1-4	5-9	10-14
ALL	122 (44.36%)	44 (16%)	45 (16.35)	33 (12%)
AML	23 (8.36)	8 (2.90)	7 (2.54)	8 (2.90)
NHL	17 (6.18)	0	10 (3.63)	7 (2.54)
HL	6 (2.18)	0	3 (1.09)	3 (1.09)
CML	5 (1.81)	0	2 (0.73)	3 (1.09)
Sarcoma	20 (7.27)	2 (0.73)	10 (3.63)	8 (2.90)
Brain tumour	20 (7.27)	4 (1.45)	6 (2.18)	10 (3.63)
Osteosarcoma	8 (2.90)	1 (0.36)	0	7 (2.54)
Retinoblastoma	8 (2.90)	3 (1.09)	5 (1.81)	0
Neuroblastomas	8 (2.90)	5 (1.81)	3 (1.09)	0
Ewing`s sacoma	7 (2.90)	0	2 (0.73)	5 (1.81)
Wilm`s tumour	6 (2.18)	5 (1.81)	1 (0.36)	0
Cancer liver	3 (1.09)	3 (1.09)	0	0
Cancer Nasophyrenx	3 (1.09)	0	0	3 (1.09)
Cancer ovary	3 (1.09)	0	0	3 (1.09)
Cancer lung	2 (0.73)	1 (0.36)	0	1 (0.36)
Cancer Stomuch	2 (0.73)	1 (0.36)	1 (0.36)	0
Cancer Testis	2 (0.73)	2 (0.73)	0	0
Hepatoblastoma	2 (0.73)	2 (0.73)	0	0
Germ cell tumour	2 (0.73)	0	0	2 (0.73)
Rhabdomyosarcoma	1 (0.36)	1 (0.36)	0	0
Spindle cell cancer	1 (0.36)	0	0	1 (0.36)

Renal cell carcinoma	1 (0.36)	1 (0.36)	0	0
APML	1 (0.36)	0	0	1 (0.36)
PNET	1 (0.36)	1 (0.36)	0	0
Spine secondary	1 (0.36)	0	0	1 (0.36)

Discussion

In JNCH during the period of four years 275 patients were diagnosed as having paediatric malignancies. In present study, it was observed that most common pediatric cancer cases diagnosed was leukemia (54.54%) amongst which ALL (44.36%) is most common of all malignancy. These results are similar to other studies. [5,6,7,8,9].

It was found that most common cancer group in the present study were leukemia (54%) followed by lymphoma (8.36%), Brain tumours (7.27%) and Sarcoma (7.27%). This result is contrary to study done by Jabeen et al showed that Lymphoma (24.2%) followed by Retinoblastoma (17.4%), leukemia (14.3%) [10]. Study by Munlima et al showed that most common cancer group was leukemia (26.9%) followed by Retinoblastoma (15.9%), CNS tumour (14.5%), Lymphoma (13.1%) [11].

In present study, it was observed that proportion of males 2.66% which were higher than studies by others [7,12,10,13]. Mean age in the present study was 7.43 with SD 4.09 which is slightly higher than study by Haleh et al [9].

In this study most of cases were in age group of 10-14 years (35%), Similar finding was seen in a study by Rajpal et al showed similar results in the age group of 10-14 years (58.18%) [14]. This result is contrary to study done by others in which most cases were between to 5-9 years age group [7,11,15]. Some Studies found most common age is 0-4 years [13,16]. In the present study, all cases were 36% in 0-4 years age group and found similar numbers in 5-9 years of age group]

The etiology of childhood cancers is largely unknown. Although genetic factors, environmental factors, maternal use of oral contraceptive pills, living in near to high voltage power line, ionizing radiation exposure during pregnancy, pesticide exposure in parents, parental occupation smoking are the factors [15]. Few environmental risk factors such as exposure to air pollutants and radiation play an important role in the incidences of childhood cancers [17]. Incidence of these cancers varies throughout the world with regard to age, gender, ethnicity, socioeconomic status and geography [7].

Apart from being retrospective study this study has the limitation this current study is a single institution based study restricted by a small sample size and hence this retrospective review cannot serve as a benchmark for reference, Hence further multi institutional studies over a longer duration of time needs to be done to serve as a benchmark for future.

Conclusion

Although the exact incidence rate cannot be provided by this single institution-based study, the information is useful in showing distribution pattern of childhood malignancy in this region. It is not possible to prevent cancer in children. The most effective way to reduce the incidence of cancer is to focus on a early and correct diagnosis followed by effective therapy. Programmes to promote early and correct diagnosis have been successfully used in countries of all income level, often through collaborative effort of government, civil society and non-government organization with vital roles played by parent group.

What this study adds to existing knowledge?

This study is a single institution-based study done in Jawahar Lal Nehru cancer hospital, Bhopal. This is oldest cancer hospital in this region and patients comes from all over the Madhya Pradesh, Chhattisgarh and adjoining areas, hence from the study, a representation of spectrum of various malignancies in this part of India was generated.

Author's contribution

Dr. Vidhi Gupta: Data collection, data analysis, literature search, drafted initial manuscript and approved the final manuscript before submission.

Dr. Ashish Kalraiya: Conceptualized the study, develop the study design, did literature search, data analysis, revised the manuscript and approved the final manuscript before submission.

Dr. Dinesh Mekle: Data analysis, literature search, revised the manuscript and approved the final manuscript before submission.

Abbreviations

TYPE	Abbreviation
ALL	Acute lymphoblastic leukemia

AML	Acute myeloid leukemia
CML	Chronic myeloid leukemia
NHL	Non- Hodgkin Lymphoma
HL	Hodgkin Lymphoma
-APML	Acute Promyelocytic leukemia
PNET	Primitive Neuro Ectodermal tumour

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