

Incidence and pattern of paediatric cancers from a tertiary care institute

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Abstract

Introduction: Paediatric tumours constitute 6 to 8% of all cancers. India has approximately 1/5 of world's paediatric cancer load.

Objective: To analyse the demographic data and pattern of paediatric cancers in a tertiary care Institute.

Materials and methods: All paediatric cancer cases age less than 15 years registered during the year 2019 were enrolled in the study. Data is obtained from the registry. Frequency distribution and descriptive statistics were analysed using graph pad prism software.

Results: Total of 394 paediatric cases were registered out of which 246 /394 (62.4%) were haematological malignancies and 148/ 394 (37.6%) were solid tumours. Median age was 6.4 years with range (infants to 15 years) and male to female ratio was 1.47:1. The most common haematological malignancy was acute lymphoblastic leukaemia ALL – 65% (160 / 246) followed by acute myeloid leukaemia AML – 19.5% (48/246) and lymphomas were the 3rd most common in which Hodgkin lymphoma constituted 7%(17/ 246) of haematological malignancies. Among solid tumours CNS tumours were the most common 24.3% (36/148) followed by RMS 15.5% (23 /148) and neuroblastoma 13.5%(20/ 148) as 2nd and 3rd most common, respectively.

Conclusion: Acute leukaemias are the most common diagnostic group of childhood cancer. Among solid tumors, CNS malignancies predominate.

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I. Introduction

Paediatric tumours constitute 6 to 8% of all cancers. India has approximately 1/5th of world's paediatric cancer load. The 5-year survival of all paediatric cancers is 75 to 80%¹, however in resource challenged countries like India the outcome is poor². The reason for lagging behind the west is inferior service, research and education. Apart from poor infrastructure and lack of trained staff, socio cultural and economic factors, ignorance, cancer illiteracy contribute to late presentations and poor outcomes in India³. Purpose of this is to analyse the demographic data and pattern of paediatric cancers in a tertiary care institute.

II. Materials And Methods:

All paediatric cancer cases aged less than 15 years registered during the year 2019 from January 1st to December 31st were enrolled in the study. Data is obtained from case files and hospital registry. The cancers were broadly divided into hematological and solid tumors. Leukaemias and lymphomas were categorised as hematological malignancies. Leukemias was subdivided into acute lymphoblastic leukaemia, acute myeloid leukaemia, acute promyelocytic leukaemia and chronic myeloid leukaemia. Lymphomas was subdivided into Hodgkin lymphoma, Non-Hodgkin lymphoma which include Burkitt's lymphoma. Solid tumors categorised according to the site and histology of the tumor, which include CNS malignancies, rhabdomyosarcoma (RMS), Wilms' tumor, Hepatoblastoma, Neuroblastoma, Retinoblastoma, Germ cell tumors, Langerhans cell histiocytosis and bone sarcomas. Central nervous system tumors include Medulloblastoma, Ependymoma and gliomas. Frequency distribution and descriptive statistics were analysed using graph pad prism software.

III. Results:

Total of 394 paediatric cases were registered out of which 246 /394 (62.4%) were haematological malignancies and 148/ 394 (37.6%) were solid tumours. All leukaemias constitute of 54.5% (215/394) whereas lymphomas 7.8% (31/394), CNS tumors 9.1% (36/394), RMS 5.8% (23/394), bone sarcomas 7.6% (30/394), Neuroblastoma 5% (20/394), Wilms tumor 4.3% (17/394), hepatoblastoma 2.2% (9/394)

and Germ cell tumors 2% (8/394) among all malignancies were noted. Median age was 6.4 years with range (infants to 15 years) and male to female ratio was 1.47:1. The most common hematological malignancy was acute lymphoblastic leukemia ALL –65% (160 / 246) followed by acute myeloid leukemia AML –19.5% (48/246) and lymphomas were the 3rd most common in which Hodgkin lymphoma constituted 7% (17/ 246). Among solid tumours CNS tumours were the most common 24.3% (36/ 148) followed by RMS 15.5% (23 /148) and neuroblastoma 13.5% (20/ 148) as 2nd and 3rd most common, respectively.

Table 1: Distribution of childhood hematolymphoid malignancies

Diagnosis	Total cases (246)	Boys (150)	Girls (96)	Median age (years)
ALL	160	92	68	6
AML	48	31	17	8
APML	4	3	1	10.5
CML	3	2	1	4
NHL	3	1	2	4
Hodgkin's	17	14	3	9
Burkitt's	11	7	4	4

ALL- Acute lymphoblastic leukemia, AML - Acute Myeloid leukemia, APML - Acute Promyelocytic leukemia, CML- Chronic Myeloid leukemia, NHL- Non hodgkin lymphoma

Table 2: Distribution of childhood solid malignancies

Diagnosis	Total cases (148)	Boys (84)	Girls (64)	Median age (years)
CNS Malignancy	36	19	17	6.5
RMS	23	14	9	4
Neuroblastoma	20	9	11	3
Ewing sarcoma	20	11	9	10
Wilms tumor	17	14	3	3
Osteosarcoma	10	8	2	13
Hepatoblastoma	9	5	4	1
Germ cell tumors	8	1	7	6.5
LCH	5	3	2	1

RMS- Rhabdomyosarcoma, LCH- Langerhans cell histiocytosis

IV. Discussion:

Worldwide annually 215,000 childhood cancers are diagnosed in less than 15 years of age¹. 80% of all childhood cancers occur in developing countries⁴ whereas the incidence of childhood cancer is about 1% in developed countries⁵.

Comparison of our results with data from Surveillance Epidemiology and End Result (SEER) program and National Cancer Institute is shown in table 3⁶. when all pediatric age groups were combined, leukemias were 27% in SEER data whereas 54.5% in our study. Lymphomas were second most common (16%) in SEER data and 3rd most common (7.8%) in our study. CNS tumors were second most common in our study (9.1%). Germ cell tumors were the 4th most common in SEER database (8%) and only 2% seen in our study. Other tumors like soft tissue sarcomas, bone sarcomas, neuroblastoma, Wilms' tumor were comparable between both the studies.

Table 3: Comparison of our study with SEER and NCI data

Cancer type	Age <1 year	Age 1- 4 years	Age 5-9 years	Age 10- 14 years	Age 15- 19 years	All pediatric ages	Our study
Leukemias	16	45	36	22	12	27	54.5
CNS tumors	11	17	4	18	9	15	9.1
Lymphomas	2	4	14	21	25	16	7.8
Germ cell tumors	9	1.5	2.4	7	16	8	2
Soft tissue sarcomas	7	4.5	7	8	6	6	5.8
Bone sarcomas	0.3	0.7	1.3	6	13	6	7.6
Neuroblastoma	26	8	2.5	0.9	0.8	4	5
Wilms tumor	7	10	5	0.9	0.8	4	4.3
Liver tumors	5	2.5	0.4	0.3	0.3	1	2.2

SEER- Surveillance, Epidemiology and End Results, NCI- National Cancer Institute

Acute leukemias are the most common diagnostic group of childhood cancers worldwide and in India^{7,8}, among which more than 95% are acute. In our study 98.6% percent were acute leukemias.

Hodgkin lymphoma is more common than Non-Hodgkin lymphoma and mixture cellularity of Hodgkin lymphoma is more common in Indian than nodular sclerosing variant with young age peak due to early Epstein Barr virus exposure compared to West^{9,10,11}. In our study Hodgkin and Non-Hodgkin lymphoma were distributed as 55% and 45% respectively. Among Non-Hodgkin lymphoma, Burkitt's lymphoma was the most common (78%).

Primary bone sarcomas rare tumors with difficult estimation of incidence¹². Yeole and Jussawalla published data in 1998 with Ewing sarcoma as the most common bone malignancy¹³. Later on TMH study¹⁴, Karnataka, Rao et al., study¹⁵ and study from JSS Medical College¹⁶ showed that majority of malignant bone tumors were osteogenic sarcomas. In our study Ewing sarcoma was more common 13.5% (20/148) than osteosarcoma 6.7% (10/148) among solid cancers.

Age adjusted rates (AAR) of childhood cancer incidence was reported by Satyanarayana et al.,¹⁰ with central nervous system tumors as the most common solid malignancy with AAR of 6.6 – 19.8 in boys, 3.0 – 16.0 in girls. In our study CNS were the most common solid tumors (9.1% among all and 24.3% among solid tumors). Neuroblastoma AAR were 1.5 – 12.6 in boys and 1.8-5.3 in girls and Soft tissue sarcoma AAR were 2.8- 7.2 in boys and 1.6-7.6 in girls. In our study soft tissue sarcomas and neuroblastoma were 5.8 % and 5% among all tumours, respectively. Wilms' tumor AAR were 3.1 – 9.5 in boys and 1.8-7.0 in girls and Germ cell tumors AAR were 1.3- 12.9 in boys and 0.2 -1.3 in girls. In our study Wilms' tumor and germ cell tumor constituted 4.3 % and 2% among all tumors respectively. Satyanarayana et al, reported higher incidence of germ cell tumors in boys whereas in our study, girls predominate 87.5% (7/8).

V. Conclusion

Acute lymphoblastic leukaemia is the most common pediatric tumor in all studies. CNS tumors were the most common solid malignancy.

Key words: Childhood cancer, Incidence

Conflicts of interest: None

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