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Original Research Article

Histopathological pattern of solid malignant pediatric tumors in Kashmir, India

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ABSTRACT

Background: Tumors that occurs in children are as diverse as those in adults and present a number of challenges for the pathologist. In general, the features of malignancies in children differ biologically and histologically from those of adults with respect to incidence, type of tumor, underlying familial or genetic aberration and tendency to regress spontaneously or cytodifferentiation. The objective of study was to the study was carried out to document pattern of childhood malignant tumors in Kashmir and compare with other studies from other parts of country.
Methods: The records of all the tumors diagnosed histopathologically in children <15 years of age during a period of 3-year (2014 to 2017) in pathology department of Government Medical College Srinagar. The sections 3-5 µ thick, are cut and stained by haematoxylin and eosin in all cases and special stains where ever feasible.
Results: A total of 46 tumors were seen in the age range of 2 month to 14 years with 26 (56.52%) in boys and 20 (43.47) in girls. Highest number of cases, 23 (50%) were in the age group of 0-5 years. Lymphomas and retinoblastoma were most common child hood malignancies followed by soft tissue tumors and CNS tumors.
Conclusions: Although the exact incidence rate cannot be provided by this hospital-based study, the information is useful in showing patterns of childhood tumors. Documentation of cases, advanced diagnostic methods like IHC, cytogenetic studies and treatment modalities with close follow up is needed to achieve better outcome.

Keywords: Histopathology, Malignant, Pediatric, Solid

INTRODUCTION

Cancer is generally regarded as a disease of adults but tumors that occurs in children are as diverse as those in adults and present a number of challenges for the pathologist.[1] Worldwide, it is estimated that about 8.1 million new cases of paediatric cancers are diagnosed annually, the greatest burden being borne by the developing countries where more than 90% of the world's children live.[2] Compared with cancers that occur in adults, childhood cancers are rare comprising only 1% of all the cancers.[3] >10% of all deaths in children below 15-year of age are caused by malignant diseases in the developed countries.[4] In India, although infections and malnutrition are the major factors contributing to morbidity and mortality, with the development of preventive and curative measures of treatment, as well as fight against the malnutrition, malignant tumors in children have become the second biggest killer.[5-7]

In general, the features of malignancies in children differ biologically and histologically from those of adults with respect to incidence, type of tumor, underlying familial or genetic aberration and tendency to regress spontaneously

or cytodifferantiate.[8] The principal groups of cancer in children are leukemias, lymphomas, and sarcomas, whereas in adults the chief cancers are carcinomas.[9] In recent years, identification of specific genes, oncogenes, tumor markers and other biological and pathological factors have played an important role in staging and classifying risk categorization of specific tumors as low, intermediate and high-risk lesions. This concept uses risk factors as predictors of outcomes. Risk-based management allows the pediatric medical and surgical oncologist to weigh the risks and benefits of treatment for each patient in an effort to maximize survival, minimize morbidity, and improve the quality of life. Hence there is need for accurate histopathological reporting in conjugation with ancillary methods.[10-13]

The purpose of this study is to determine the pattern of malignancies seen in childhood at the Government Medical College Srinagar Kashmir and compare with previous reports from other parts of India.

METHODS

This study is a retrospective study conducted in the Department of Pathology of a tertiary care hospital in Srinagar to evaluate the incidence and morphological features of solid malignant tumors in children of fifteen years and below over a three-year period from June 2014 to May 2017. The records of all the tumors diagnosed histopathologically in children <15 years of age during the study period were retrieved and analyzed.

The clinical history regarding duration of the disease, mode of presentation, symptoms and signs are recorded from the case papers, request forms, patient's history, clinical data along with relevant details obtained from available hospital and departmental records.

The histopathology slides and paraffin blocks are reviewed. Gross examination is done carefully noting the size, shape, extent and configuration, nodularity, consistency (solid, cystic or mixed) and torsion.

A minimum of 4-5 bits are selected from the representative areas of tumor. The tissue for routine microscopy is preserved and fixed in 10% neutral buffered formalin for 24 hours and processed in automatic tissue processor (Leica) and embedded in paraffin. The sections 3-5 µ thick, are cut and stained by haematoxylin and eosin in all cases and special stains like PAS, and MTS were done where ever feasible.

RESULTS

The study included 46 cases of solid malignant tumors of childhood over a period of 3 years. The youngest patient at the time of diagnosis is two months old and diagnosed as retinoblastoma. The majority of the tumors in this study occurred between 0-5 years (50%), followed by 6-10 years age group (34.78%) (Figure 1).

Table 1: Histological subtypes of tumor with relation to sex.

Histological subtypes	Male	Female	Total (%)	M:F ratio
Lymphoma	7	4	11 (23.91)	1.75:1
Hodgkin lymphoma	2	1		
Non-Hodgkin's lymphoma	5	3		
Bone tumors	1	3	4 (8.6)	1:3
Osteosarcoma	0	1		
Ewing's sarcoma/PNET	1	2		
Retinoblastoma	4	7	11 (23.91)	1:1.75
CNS tumors	3	1	4 (8.6)	3:1
Medulloblastoma	1	1		
Astrocytoma	1	0		-
Pilocytic astrocytoma	1	0		
Rhabdomyosarcoma	3	2	5 (10.86)	1.5:1
Wilm's tumor	2	0	2 (4.34)	-
Neuroblastoma	2	1	3 (6.5)	2:1
Papillary carcinoma thyroid	1	1	2 (4.34)	1:1
Immature teratoma	2	0	1 (4.34)	-
Congenital infantile fibrosarcoma	1	0	1 (2.17)	
Hepatoblastoma	0	1	1 (2.17)	
Total	26 (56.52)	20 (43.47)	46 (100)	1.3:1

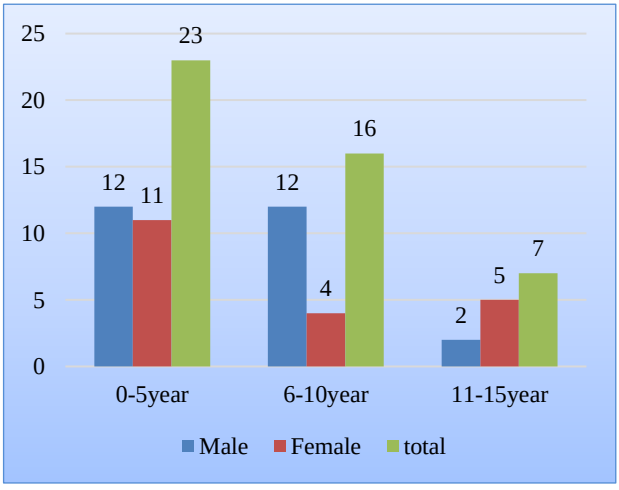

Figure 1: Age and gender distribution.

Out of 46 malignant tumors 26 (56.52%) were seen boys and 20 (43.47%) were seen in girls under the age of 15

years, showing male preponderance and male to female ratio of 1.3:1 (Figure 2).

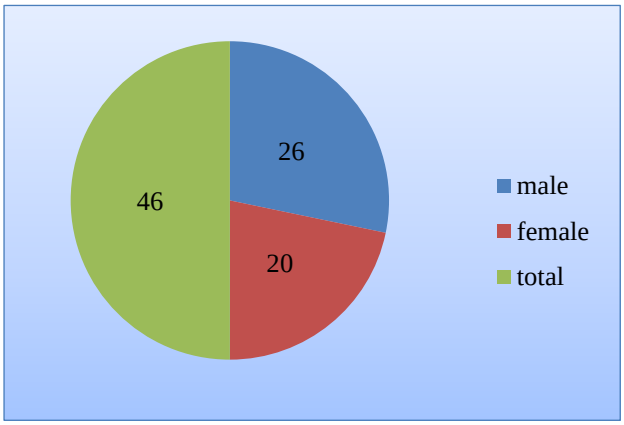

Figure 2: Gender distribution.

In present study lymphomas and retinoblastomas were most common 11 cases (23.91%) each malignant tumors followed by 5 cases 10.86% of rhabdomyosarnoma, 4 cases of CNS tumors, 3 cases neuroblastoma, 3 cases of bone tumors, wilms tumors and immature teratoma and pappilary thyroid carcinoma 2 cases each.

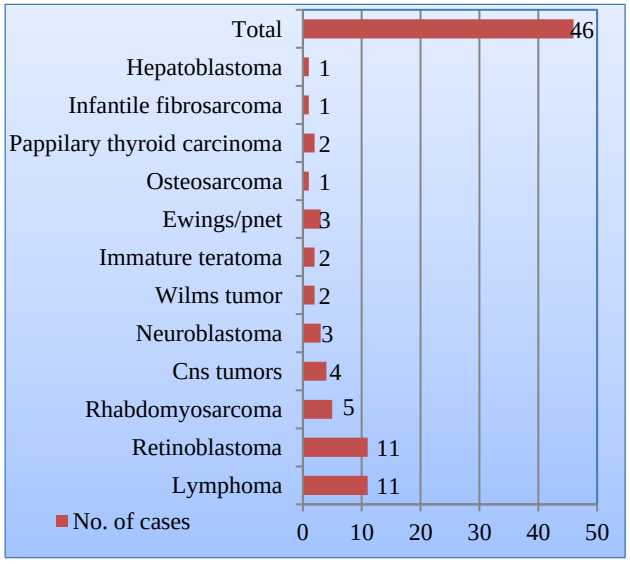

Figure 3: Histological types of tumors.

Hepatoblastoma and congenital infantile sarcoma were rare and only 1 case of each was seen. The relative frequency of other malignant neoplasms is as shown in Table 1 and Figure 3.

DISCUSSION

Childhood tumors form a highly specific group, mainly embryonal in type and arising in the lymphoreticular tissue, CNS, connective tissue and viscera. Unlike adults, epithelial tumors are rare.[3] In India, although infections and malnutrition are the major factors contributing to morbidity and mortality, malignancies are coming into greater focus because of preventive measures being taken for the former.[5] The various malignant tumors of childhood encountered in the present study are compared with similar studies conducted in India and abroad. The malignant tumors of all types are being reported during early life but their common site of origin differs sharply from those of adults, for example Leukemias, CNS tumors, soft tissue tumors, bone and kidney tumors are common sites of origin of malignant tumors in infants and children. Maximum number of childhood tumors were seen in the age group of 0-5years. similar to the observations of Dewani et al and Jussawala and Yeole Table 2.[7,14]

Table 2: Comparison of age group distribution of tumors in various studies.

Series	0-5 years	6-10 years	11-15 years
Jain KK	4.2%	22.2%	35.5%
Dewani[7]	47.2%	40.9%	11.9%
Jussawala[14]	42%	29%	29%
Present study	50.0%	34.78%	15.21%

Male predominance is a salient feature of many childhood tumors as was in our study and many other studies.[15,16]

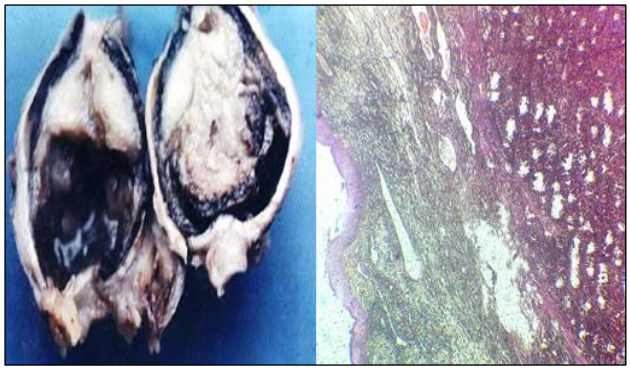

Figure 4: (a) Gross image of retinoblastoma; (b) Microphotograph of normal layers eye with retinoblastoma (H& E 100X).

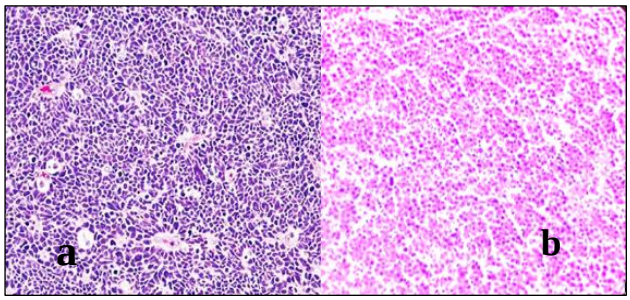

Figure 5: (a) Microphotograph showing sheets of round cells in medullablastoma H&E 200X; (b) Mmicrophotograph of Ewings sarcoma.

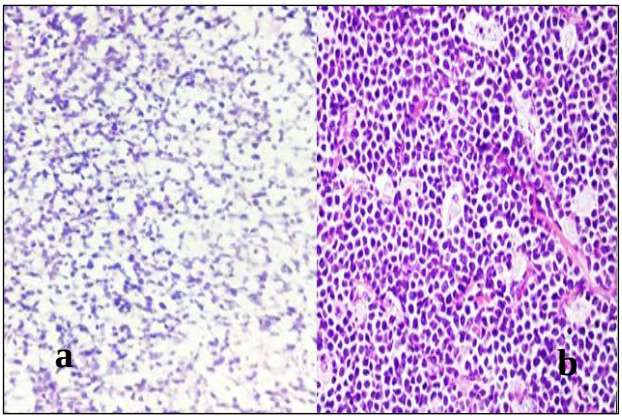

Figure 6: (a) microphotograph of same rhabdomyosarcoma (H&E100X); (b) microphotograph of Hodgkins lymphoma (H&E 400X)

All though there was overall male predominance but retinoblastoma and bone tumors were predominantly seen in females. This study has observed a change in the proportion of childhood malignancies as compared to other studies in similar settings.

Retinoblastoma and lymphomas were the commonest childhood malignancy (23.33%) each followed by rhabdomyosarcoma, CNS tumors, and neuroblastoma. In an earlier study done from Kashmir by Shah A lymphomas were commest malignant tumor followed by wilms tumor.[17]

This could probably be due to regional variation or because of selection bias, our study being a hospital-based study, the number of cases being less compared with the other studies and associated ophthalmology hospital is the only tertiary care eye centre in valley.

Table 3: Comparison of Histological types of tumor in different studies.

Histological type	Banerjee et al[5]	Venugopal et al[18]	SharmaS et al[1]	Sweden study Ljungman et al[17]	Present study
lymphomas	25.92%	20.95%	21.41%	21.9%	23.91%
Retinoblastoma	8.7%	-	6.49%	-	23.91%
CNS tumors	15.32%	-	9.74%	-	8.6%
Soft tissue tumors	14.3%	10.4%	7.79%	14.5%	13.04%
Bone tumors	10.52%	3.8%	9.74%	9.4%	8.6%
Neuroblastoma	4.5%	11.4%	3.89%	14.3%	6.5%
Wilms tumor	8.4%	24.76%	19.48%	14.7%	4.3%
Immature teratoma	3.8%	4.76%	8.44%	10.9%	6.6%
PTC	-	-	-	-	3.33%
Hepatoblastoma	-	-	-	-	2.1%

Retinoblastoma (RB)

A total of 11 patients with RB were seen during the study period contributing 23.91% of the study population. The mean age at presentation was 2 years (range 3 months-6 years) and the male to female ratio was 1:1.75. Two patients 18% had bilateral disease at time of diagnosis

Lymphomas

Eleven cases of lymphoma are diagnosed during the study period. These accounts for 23.91% of all the pediatric malignant solid neoplasms seen in this study. Seven cases (63.63%) are seen in males while 4 cases (36.36%) are seen in females. This give a male: female ratio of 1.75:1. Non- hodgkin's lymphoma accounts for 8 (72.72%) of all lymphomas) while other Hodgkin's lymphomas account for 3 cases. (27.27% of all lymphomas). The mean age at present was 5.5 years.

CONCLUSION

The distribution of the various childhood malignancies like lymphomas in our study was similar to those reported from some other parts of country, Retinoblastoma was the leading childhood malignancy during the study period in contrast to previous study where lymphoma used to be the commonest malignancy.

The current study is a single institution-based study restricted by a small sample size and this retrospective review cannot serve as a benchmark for reference. This study is an attempt to provide a complete spectrum of childhood tumors diagnosed on histopathology.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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