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RESEARCH ARTICLE

SPECTRUM OF PAEDIATRIC BRAIN TUMOR IN CMCH, COIMBATORE

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Abstract

Introduction:-

Tumors of the nervous system are the second most common childhood tumor after leukemia,[l] constituting approximately 35% of all childhood malignancies and remain the leading cause of cancer related death in children.[2]Childhood central nervous system (CNS) tumors differ significantly from adult brain tumors in reference to their sites of origin, clinical presentation, tendency to disseminate early, histological features and their biological behavior. Whereas in adults the predominant CNS tumor types are metastasis, glial neoplasms andmeningiomas. In children, besides gliomas, other major tumor types including primitive embryonal neoplasms. In recent times, an enhanced understanding of these biological differences between adult and childhood CNS neoplasms has led to investigations in distinct molecular and genetic pathways and therapeutic approaches for each tumor type. However, for the necessary research required in the field of pediatric brain tumors, a thorough knowledge of the worldwide incidence and distribution of the various neoplasms is essential.

Even though there are enough data about the epidemiology of pediatric brain tumors in western population, there are only a few reports from developing countries like India. According to the Indian Council of Medical Research, National Cancer Registry data, the incidence of pediatric brain tumors ranges from 0% to 2.11%.[1] In a recent multi-institutional study from seven prestigious tertiary care centers spread across India, pediatric central nervous system tumors accounted for on an average of 14.8% (10%-21%) of total intracranial tumors.[3] In India, in the absence of a comprehensive population-based national cancer registry, we depend on local hospital-based registries for assessing the incidence of pediatric brain tumors.[4] Hence, more and more institutional data are required to assess the actual disease load in India. These data are also essential for developing proper infrastructure among various cancer centers spread across india and provide insight into geographical variation in subtype and biology of these tumors. The main objective of present study is to access the epidemiological patterns of brain tumor in children in Coimbatore medical college hospital (CMCH).

Aims And Objective Of Study:-

To analyze the epidemiological patterns of brain tumor in children in CMCH.

Material and Method:-

This is a retrospective, observational study. The medical records of children <18years registered in department of neurosurgery, CMCH from January 2015 to December 2019 diagnosed as primary brain tumors were retrieved fromneuropathology records. Primary tumors of the brain were included, whilemetastatic tumors <18 years of ageand vascular malformations were excluded. Data regardingage, gender, topography, and histopathology of 22

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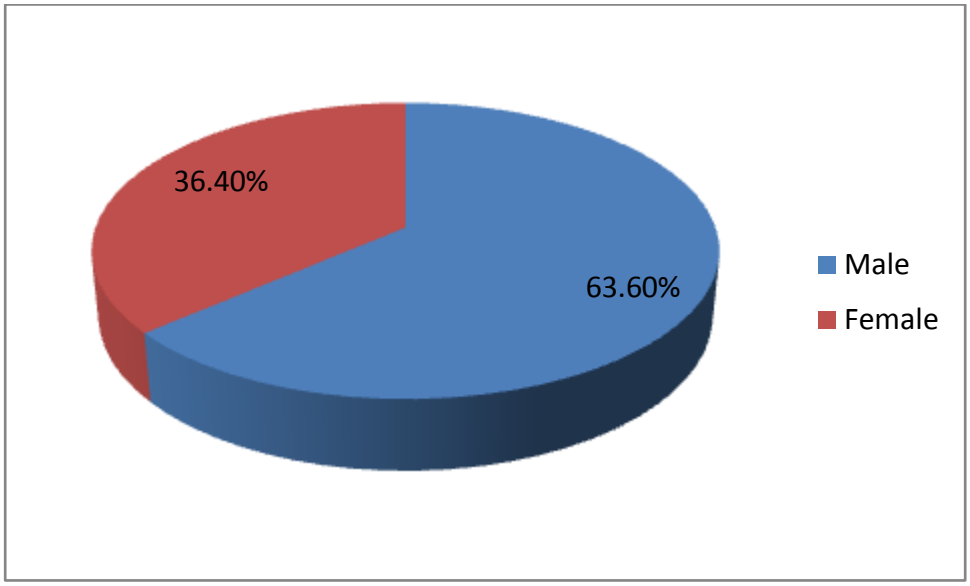
pediatric patients (0-18 years)with brain tumors operated over a period of 5 years (January 2015 to December-2019) was collected retrospectively and analyzed. The results obtained werecompared with available Indian data and western literature.

Result:-

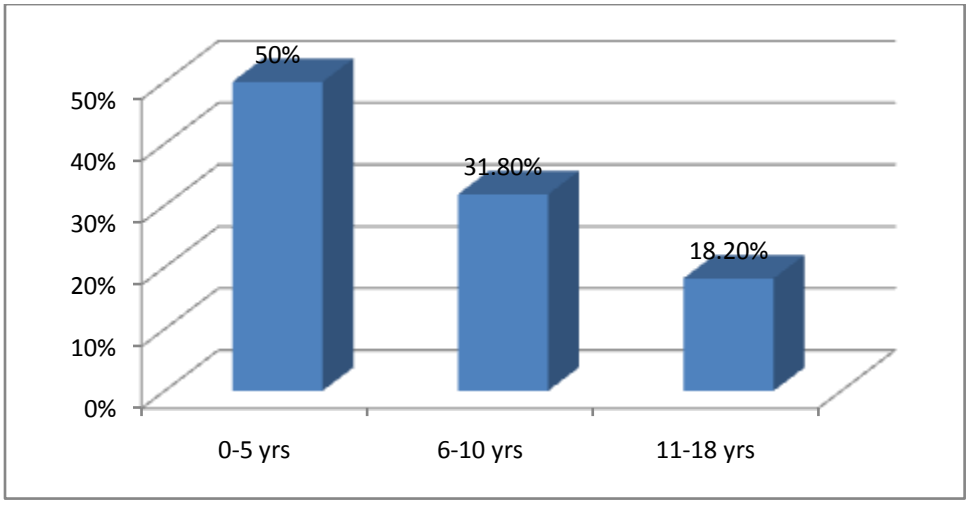
A total of 22 cases of primary pediatric brain tumors were registered in our department from August 2015 to December 2019 of 22 cases, males (63.6%) outnumbered females



Distribution

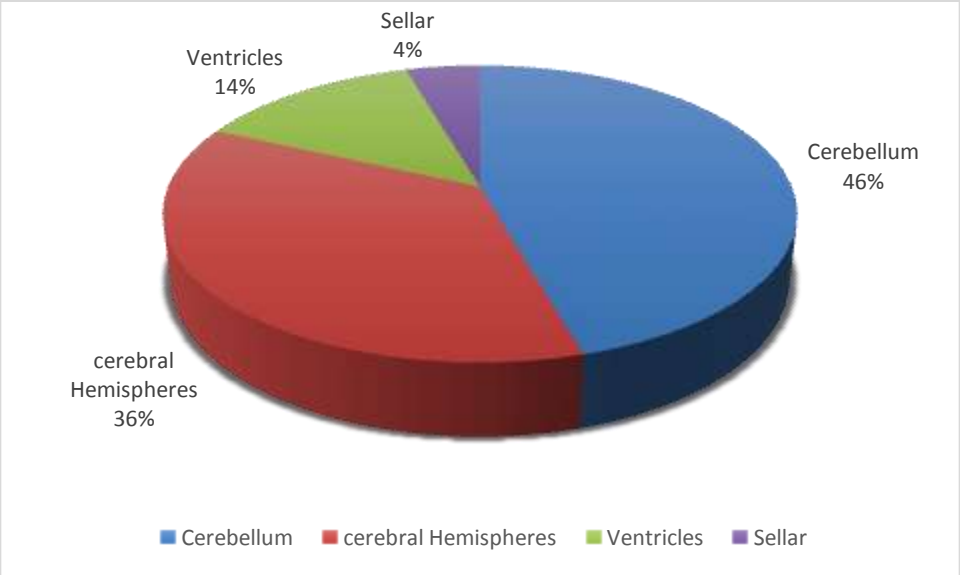
The cases were subdivided into three age groups, 0-5 years, 6-10 years, and 11-18 years. On analysis, there were 11 patients (50%) in 0-5 years groupfollowed by 7 patients (31.8%) in 6-10 years group and 4 patients (18.2%) in 11-18 years group.

	Number= n	Percentage
Male	14	63.6%
Female	8	36.4%



Location wise distribution

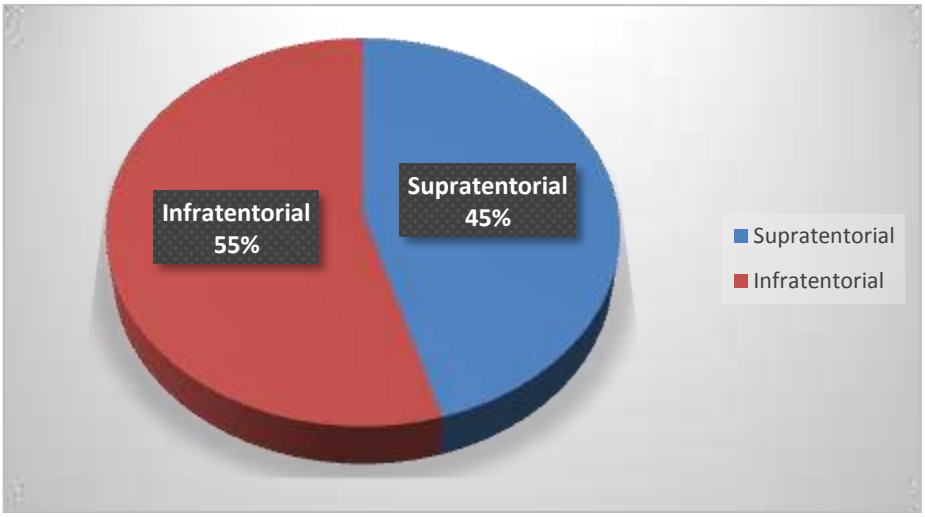
In the present study, the most common anatomical site for primary brain tumor was cerebellum (45.5%) followed by cerebral hemispheres (36.2%); ventricles (13.6%) and sellar region (4.5%).



Supratentorial and Infratentorial

The present study showed that Infratentorialtumors were more common (54.5%) as compared to Supratentorialtumors (45.5%).

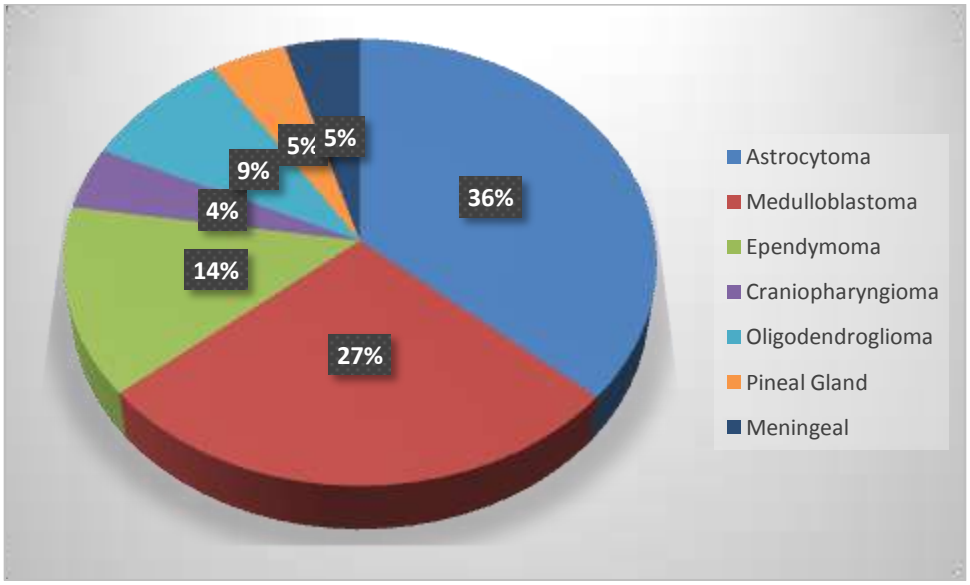
Supratentorial		Number	Total	%
	Cerebrum	6	10	45.5
	Pineal Gland	1		
	Meningeal	1		
	3rd Ventricle	1		
	Sellar	1		
Infratentorial			12	54.5
	Cerebellum	10		
	4th Ventricle	2		



Percentage of various histologic types of brain tumors

Type	Number=n	Percentage (%)
Astrocytoma	8	36.4
Medulloblastoma	6	27.2
Ependymoma	3	13.6
Craniopharyngioma	1	4.5
Oligodendroglioma	2	9
Pineal Gland tumor	1	4.5
Meningeal tumor	1	4.5
Germ Cell Tumor	0	0

The present study revealed that astrocytoma (36.4%) is the most common brain tumor in childhood. Other common tumors includemedulloblastoma (27.2%, followed by ependymoma (13.6%), oligodendroglioma (9%), Pineal gland tumor (4.5%), craniopharyngioma (4.5%) and meningeal tumor (4.5%)



Histological Distribution

The percentage of various types of brain tumors in each age group is given in the table below. Medulloblastoma was the most common histology in 0-5 years age group, whereas in 6-10 years age groups, astrocytoma was the predominant histologic type.

Percentage of various histologic types of brain tumors in 0-5 age group

Type	Number = n	Percentage (%)
Medulloblastoma	4	36.4
Astrocytoma	3	27.3
Ependymoma	2	18.2
Oligodandroglioma	1	9.1
Meningeal	1	9.1

Percentage of various histologic types of brain tumors in 6-10 age group

Type	Number = n	Percentage (%)
Astrocytoma	4	57.1
Ependymoma	1	14.3
Oligodendroglioma	1	14.3
Medulloblastoma	1	14.3

Percentage of various histologic types of brain tumors in 11-18 age group

Type	Number = n	Percentage (%)
Astrocytoma	1	25
Medulloblastoma	1	25
Pineal Gland Tumor	1	25
Craniopharyngioma	1	25

Discussion:-

Pediatric brain tumors are a heterogeneous group of neoplasms which varies in their cell of origin, clinical features, treatment strategies, and clinical outcomes. Even though significant advances are made in the management of many other pediatric malignancies, pediatric brain tumors still pose a tough challenge to oncologists worldwide.

In developing countries like India, due to lack of complete registration of newly diagnosed cases with local cancer registries, the exact tumor burden of such diseases goes unnoticed and is underestimated. Hospital-based prevalence data therefore forms the basis for estimating the disease load. This data is essential for ascertaining the required healthcare infrastructure in the management of these diseases, and for assessing geographical differences in their molecular and genetic profiles. With increased availability of diagnostic facilities and better healthcare, the incidence of CNS tumors seems to be on the rise in developing countries

In our study, the most common brain tumors in the pediatric age group in descending order are astrocytoma, medulloblastoma, followed closely by ependymoma. In western population, it was found that astrocytomas and medulloblastomas are the two most common brain tumors in children. These tumors are the most common tumors in our study too. Various studies from Asian centers also confirm these data. Another interesting observation is that ependymoma is the third most common childhood brain tumor in various Western studies from Germany,[5] Canada,[6] Sweden,[7] and Morocco.[8] In the present study too, ependymoma is the third most common brain tumor. On the contrary, craniopharyngioma is the third most common tumor in various Asian studies from Korea,[9] Beijing,[10] Japan,[11] and also in a large multi-institutional study from India.

Comparisons of percentage of types of pediatric brain tumors from various countries of West with our study

	Brazil	Germany	Canada	Sweden	Morocco	Present Study
Astrocytoma	32.5	41.7	39.4	51	37.1	36.4
Oligodendroglioma	0.9	1.1	1.7	0	1.7	9
Ependymoma	7.4	10.4	7	8	12	13.6
Medulloblastoma	13.9	25.7	15.4	17	28.9	27.2
Germ cell tumors	3.6	NA	3.1	1.5	0.9	0
Craniopharyngioma	11	4.4	6.8	4.6	6.6	4.5
Pineal tumor	NA	1.3	0.5	2.7	0.7	4.5
Meningeal	3	1.2	2	1.6	2.2	4.5

Comparisons of percentage of types of pediatric brain tumors from various Asian countries with our study

	Korea	Beijing	Japan	India	Present Study
Astrocytoma	27.8	30.5	35.7	34.7	36.4
Oligodendroglioma	2.6	6.2	0	1.1	9
Ependymoma	8.1	5.6	4.8	9.8	13.6
Medulloblastoma	19.8	14.6	10	22.4	27.2
Germ cell tumors	8.1	7.9	14.3	2	0
Craniopharyngioma	9.2	18.4	10.5	10.2	4.5
Pineal tumor	NA	0.6	0	1.3	4.5
Meningeal	2.6	3.1	1.9	3.2	4.5

Though this was a hospital-based study with small cohort and data collection was restricted to short duration, results were comparable to those observed in other mentioned hospital-based and population-based studies. The current study is a single tertiary care center study and needs cautious interpretation. The population-based studies are

required to study the demographics and determine the burden of CNS malignancies among the pediatric patients in India. This is only possible if regional cancer registries are maintained meticulously.

Conclusion:-

From the present series, we conclude that, the frequencies of major histologic types of Pediatric brain tumors found in the study do not differ substantially from that found in other developed and developing countries except for slightly higher frequency of oligodendroglioma. Medulloblastomas and astrocytomas, which form the major histologic types in pediatric patients need special attention. Epidemiological surveillance of various histological types of Pediatric brain tumors is of great importance from public health perspective. It helps in planning the distribution of infrastructure and resources toward the disease management and preventive programs. In countries like India where there is a scarcity of data because of inadequacies in tumor registration, such hospital-based studies have a major role to play in such planning.

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