

Study of Incidence of Pediatric Central Nervous System Tumors as Per Age Group

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ABSTRACT

Introduction: CNS tumors are the most common solid tumors in children. Tumors of the central nervous system can be divided into primary intracranial tumours that arise from parenchyma of brain, pituitary gland, covering of brain & secondary intracranial tumours which represent local extension from regional tumours or metastasis from primary malignancy in the body. The most common location of the brain tumours in childhood is below the tentorium within the posterior cranial fossa. **Materials and methods:** Surgical specimen of central nervous system of children (0 to 14 year of age group) received from August 2013 to November 2015, in the Tertiary care center, Ahmedabad were studied with keeping the following features in mind: Age, Sex and site of tumours. **Results:** Fifty eight cases of central Nervous system Tumours between the age of 0 to 14 years over a period of 2.5 years at civil hospital, Ahmedabad were studied. Incidence were more common in male (60.34%) than female(39.66%) 89.65% were intracranial to 10.35% were intraspinal tumours. Commonly encountered tumour in descending order of frequency were Medulloblastoma (27.58%), astrocytoma (24.13%), Ependymoma (20.68%). All medulloblastomas arose infratentorial, schwannomas arose intraspinal and meningiomas in cranial cavity are supratentorial. **Conclusion:** CNS Tumors constitute a large proportion of cancers in childhood. They differ from adult CNS tumors both histologically and location wise. Site of the tumor is significant as it can lead to fatal consequences

Keywords: CNS tumors, Infratentorial, Posterior cranial fossa,

Introduction

Neoplasm of CNS have several unique features some due to very specialized tissue from which they originate & other from the anatomic peculiarities of this region¹. Incidence in children younger than 10 years of age include (1) Leukemia (Principally ALL) (2) Neuroblastoma (3) Wilms tumour (4) Hepatoblastoma (5) Retinoblastoma (6) Rhabdomyosarcoma (7) Teratoma (8) Ewing Sarcoma & finally posterior fossa neoplasm principally (9) Juvenile astrocytoma (10) Medulloblastoma (11) Ependymoma². Tumors of the central nervous system can be divided into primary intracranial tumours that arise from parenchyma of brain, pituitary gland, covering of



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brain & secondary intracranial tumors which represent local extension from regional tumors or metastasis from primary malignancy in the body³. The most common

location of the brain tumors in childhood is below the tentorium within the posterior cranial fossa⁴. It was stated that brain tumors were uncommon in India, but due to the availability of more sophisticated diagnostic facilities such as C.T. scan, M.R.I. & Myelography etc. It has become obvious that brain tumors are as common in this country as elsewhere⁵.

Aim of the Study

The Aim of study was to study of the pathology of the Pediatric C004E S tumours in relation with age, sex, location & incidence.

Materials and Methods

Surgical specimen of central nervous system of children (0 to 14 year of age group) received from August 2013 to November 2015, in the Tertiary care center, Ahmedabad were studied with keeping the following features in mind: Age, Sex and site of tumors. The gross examination of the specimens was done. The following points were noted size shape consistency and outer appearance. The specimen were studied by both frozen section and paraffin sectioning. For frozen section the freezing microtome was used (with ethyl chloride spray).

Five micron thick section were cut from formalin fixed and paraffin embedded tissues. Routine hematoxyline and eosin (H & E) staining were employed for all the section studied. Special stains viz. reticulin, phosphotungstic and hematoxylin (PTAH), periodic acid Schiff (PAS) were done as and when required.

Results

Overall incidence of C.N.S. tumours in 0-14 years age group at Tertiary care centre, Ahmedabad, during August 2013 to November 2015.

Table 1 Incidence of CNS Tumours

No.	Type of Tumour	No. of case		Total	Percentage of total
		I/C	I/S		
1	Medulloblastoma	16	0	16	27.58
2	Astrocytoma	14	0	14	24.13
3	Ependymoma	9	3	12	20.68
4	Craniopharyngioma	5	0	5	8.62
5	PNET	2	0	2	3.45
6	Meningioma	1	1	2	3.45
7	Choroid plexus papilloma	2	0	2	3.45
8	Oligodendroglioma	1	0	1	1.73
9	Schwannoma	0	2	2	3.45
10	Pituitary adenoma	1	0	1	1.73
11	Haemangioblastoma	1	0	1	1.73
	Total	52	6	58	100.00

Table 1 shows: I/C intracranial: 52 (89.65%) I/S Intra Spinal: 6(10.34%). The most common tumour is medulloblastoma and next astrocytoma and ependymoma

Table 2 Incidence of “Intra Cranial” Tumours in children

No.	Type of tumour	No. of Case	Percentage
1	Medulloblastoma	16	30.18
2	Astrocytoma	14	26.42
3	Ependymoma	9	16.98
4	Craniopharyngioma	5	09.43
5	PNET	2	03.77
6	Meningioma	1	01.89
7	Choroid plexus papilloma	2	03.77
8	Oligodendroglioma	1	01.89
9	Pituitary adenoma	1	01.89
10	Haemangioblastoma	1	01.89
	TOTAL	52	100.00

Table 2 shows that most common tumor in intracranial cavity. Medulloblastoma Astrocytomas and Ependymoma are also common tumor in cranial cavity, while Craniopharyngioma, Pituitary adenoma, Meningioma and Choroid plexus papilloma are not uncommon in pediatric age group.

Table 3 Incidence of Intra Spinal Tumour in Children in present Series

No.	Type of tumour	No. of Case	Percentage
1	Ependymoma	3	50
2	Meningioma	1	16.66
3	Schwannoma	2	33.33
	TOTAL	6	100.00

Table 3 shows that Ependymoma is more common intraspinal tumor in paediatric age group.

Table 4 Shows that Astrocytoma, Medulloblastoma and Ependymoma more common in male in intracranial cavity, while craniopharyngioma is more common in female in cranial cavity in present series.

Table: 4 Distribution of tumour according to sex in Children

No.	Tumours	C/S	No. of Male	No. of Female	Ratio M:F
1	Medulloblastoma	C	11	5	2.2:1
2	Astrocytoma	C	10	4	2.5:1
3	Ependymoma	C S	6 1	3 2	2:1 1:2
4	Schwannoma	C S	0 2	0 0	- -
5	Meningioma	C S	0 1	1 0	- -
6	PNET	C	2	0	-
7	Craniopharyngioma	C	1	4	1:4
8	Oligodendroglioma	C	1	0	-
9	Choroid plexus papilloma	C	1	1	1:1
10	Pituitary adenoma	C	1	0	-
11	Haemangioblastoma	C	0	1	-

C: Cranial S: Spinal

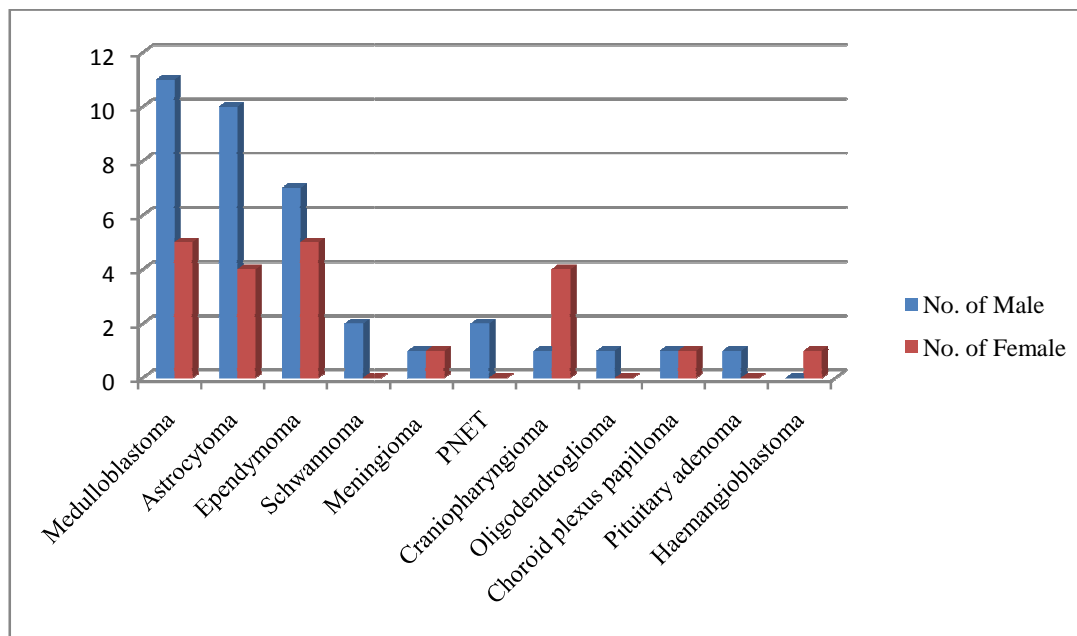
Image 1:- Graph showing Distribution of tumour according to sex in Children

Table 5 shows that Astrocytoma is more common in age 6-14 years, Medulloblastoma is more common in age 0-10 years and Ependymoma, Meningioma and Craniopharyngioma are more common in age 11-14 years in present series.

Table: 5 Incidence of paediatric CNS tumors as per age group

No.	Type	0-5 yrs	6-10 yrs	11-14 yrs
1	Medulloblastoma	7	5	4
2	Astrocytoma	4	4	6
3	Ependymoma	4	2	6
4	Craniopharingioma	1	0	4
5	PNET	1	1	0
6	Meningioma	0	0	2
7	Choroid plexus papilloma	2	0	0
8	Oligodendroglioma	0	0	1
9	Schwannoma	0	1	1
10	Pituitary adenoma	1	0	0
11	Haemangioblastoma	0	1	0
	TOTAL	20	14	24

Table 6 Distribution of Intracranial tumours

No.	Tumour	Supratentorial	Infratentorial
1	Medulloblastoma	0	16
2	Astrocytoma	5	9
3	Ependymoma	6	3
4	Craniopharingioma	5	0
5	PNET	2	0
6	Meningioma	1	0
7	Choroid plexus papilloma	2	0
8	Oligodendroglioma	1	0
9	Pituitary adenoma	1	0
10	Haemangioblastoma	0	1
	TOTAL	23(44.23%)	29(55.77%)

Table 6 shows that Astrocytoma is more common in Supratentorial, medulloblastoma in infratentorial and all meningioma are seen in supratentorial position in present series.

Image -2 Medulloblastoma with Extensive Nodularity, H&E stain, 100X

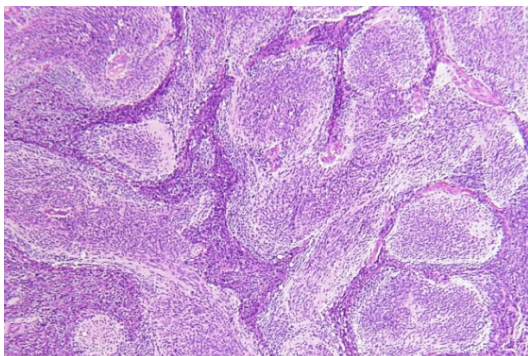


Image -3 Pilocytic Astrocytoma, H&E stain, 100X

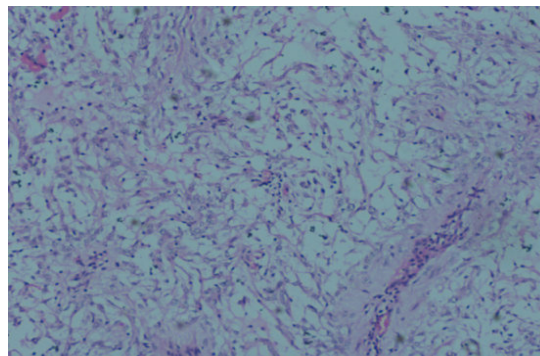


Image 4 Ependymoma, H&E stain, 100X

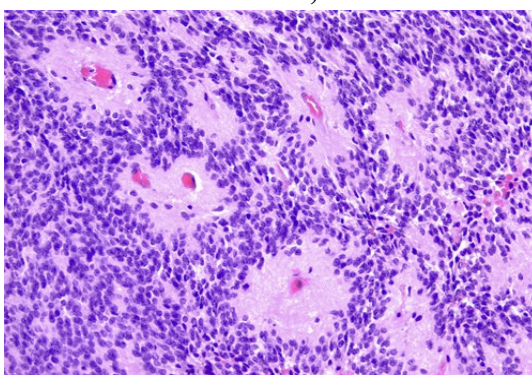


Image 5 Myxopapillary ependymoma, H&E stain, 100X

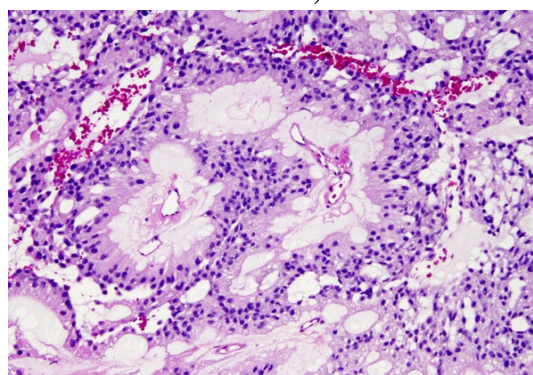


Image 6 Pituitary Adenoma, H&E stain, 100X

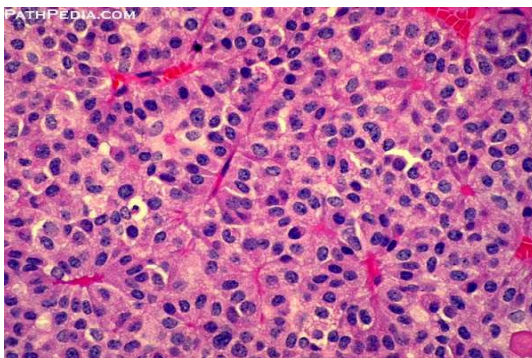
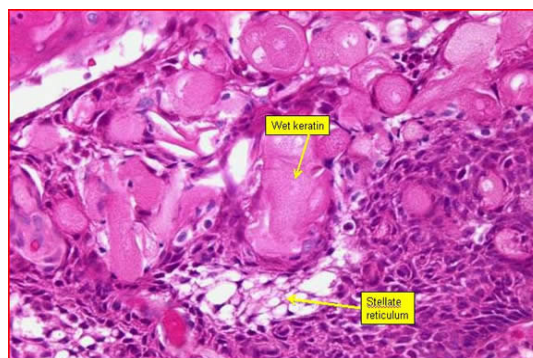


Image 7 Craniopharyngioma, H&E stain, 100X



Discussion

Cancer of central nervous tumors are considered among the most notorious of all cancers. The brain and spinal cord are the most complex and delicate organs that controls the higher functions, peripheral nervous system and various voluntary and involuntary functions. Results of the present series are given in table 1 to 7. These results are compared with series, of Dastur and Lalitha (1980)⁵, of Ramamurthi (1970)⁶ and that of Scholenberg,⁷ of Ertel⁸ of Heiskanen⁹, Kadri et al.¹⁰, Farwell Dohrmann¹¹. Dastur and Lalitha (1980) reported that 13.32% of all intracranial tumours occurred in childhood while Ramamurthi (1970) showed it be 13.80% as against all age group intracranial tumors. According to Koos and Miller

(1971)¹¹, the incidence of intracranial tumors in childhood are 11.67% as against all age group. In present series the incidence of intracranial tumor as against all age group is 25.86% which closely approximates the incidence of 25.6% reported by ShuangShoti et al (1974) in Thailand.

According to Rubinstein (1972)⁴, 80 to 90% of C.N.S. neoplasm occur in cranial cavity below the age of 4 years. In present series 89.65% of C.N.S. Tumors are intracranial while 10.34% are intraspinal in children. This correlate with the incidences of intracranial tumors (95.69%) to intraspinal tumors (4.30%) of Farwell Dohrmann. In children according to stern Smith and fincher, Ingramand Matson Infratentorial tumors are more predominant than supratentorialtumours. In present series 44.23% of cranial tumor are supratentorial and 55.76% are infratentorial. This study closely correlates with the series of Kadri et al¹⁰. The series of C.N.S. tumors in Mexico by De la Torre, RidauraSanz C (1993)¹² states the most common tumors are astrocytoma, medulloblastoma, Ependymoma and craniopharyngioma. In the present series the most common tumors of childhood are Medulloblastoma (27.58%), Astrocytoms (24.13%), Ependymoma (18.96%) closely correlates with the above mentioned studies.

Conclusion

In our study 58 cases of central Nervous system Tumours between the age of 0 to 14 years over a period of 2.5 years at civil hospital, Ahmedabad were studied. Incidence were more common in male (60.34%) than female (39.65%). 89.65% were intracranial to 10.34% were intraspinal tumours. Commonly encountered tumour in descending order of frequency were Medulloblastoma (27.58%), astrocytoma (24.13%), Ependymoma (20.68%). All medulloblastomaaroses in the infratentorial. All Shwannoma aroses in the intraspinal. All meningioma in cranial cavity are supratentorial.

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