

## Original Research Article

## Histopathological Spectrum of Brain Tumors in Tertiary Care Teaching Hospital in Southern Rajasthan

Preeti Agarwal<sup>1</sup>, Rashmi Monterio<sup>2</sup>, Indu Choudhary<sup>3</sup>, Narendra Mal<sup>4</sup>, Shashi Sujanani<sup>5</sup>

<sup>1</sup>Professor, <sup>2</sup>Senior Resident, <sup>3,4</sup>Assistant Professor, <sup>5</sup>Professor and Head, Department of Pathology, Pacific Medical College and Hospital, Udaipur, Rajasthan 313001, India.

**Corresponding Author:**

**Indu Choudhary**, Assistant Professor, Department of Pathology, Pacific Medical College and Hospital, Udaipur, Rajasthan 313001, India.

**E-mail:** docindudbest@gmail.com

**Received on** 04.10.2019

**Accepted on** 28.11.2019

**Abstract**

*Context:* In India tumors of Central Nervous System account for 1.9% of all tumors. Brain tumors are heterogenous group of neoplasms, affecting different age groups. The age distribution of CNS is said to be bimodal, one peak in children, the second peak in 45–70 years of age. *Aims:* Histopathological study and distribution of brain tumors in southern Rajasthan. *Settings and Design:* Cross sectional study. *Methods and material:* A total of 54 cases were retrieved from the records of histopathology section of pathology department at Pacific Medical College and Hospital for a period of 2 years from 2016 to 2017. Data regarding age, sex, histological diagnosis and site of brain tumor was collected and analyzed. *Results:* In our study peak incidence of brain tumors is found in 41–50 years age group. Male to female ratio was 1:1 except for meningioma where female predominance was noted. Frontal lobe was the most common site of brain tumors noted in our study. Astrocytoma is the most common histological diagnosis analyzed in our study. *Conclusions:* The present study highlights the histological diversity in CNS tumors. Further we need a multicentric study to have substantial data for use in future.

**Keywords:** Central nervous system; Meningioma; Astrocytoma; Neoplasms.

**How to cite this article:**

Preeti Agarwal, Rashmi Monterio, Indu Choudhary et al. Histopathological Spectrum of Brain Tumors in Tertiary Care Teaching Hospital in Southern Rajasthan. Indian J Pathol Res Pract. 2020;9(1):65–70.

**Introduction**

Central nervous system (CNS) neoplasms represent a unique heterogeneous population of neoplasms and include both benign and malignant tumors.<sup>1</sup> In India tumors of CNS constitute less than 2% of all tumors. The age distribution of CNS tumors is said to be bimodal, one peak in

children and the second peak in 45–70 years of age. Males are involved more frequently except for meningioma.<sup>2</sup>

Tumors of CNS account for as many as 20% of all cancers of childhood and next to leukemia as a cause of death. In childhood 70% of primary brain tumors are infratentorial and involve cerebellum, midbrain, pons and medulla.<sup>3</sup>

Our study was done to evaluate the clinical (age, gender, topography, signs and symptoms) and pathological (histopathological types and immunohistochemistry) characteristics of primary brain tumors in southern Rajasthan.

## Materials and Methods

The study was conducted in department of Pathology in collaboration with department of Neurosurgery of Pacific Medical College and Hospital, a tertiary care teaching hospital, Udaipur Rajasthan. It was a retrospective study carried out for 2 years from January 2016 to December 2018. This study was approved by the institutional ethical committee.

We studied total 54 cases of brain tumors. Data on clinical presentation, radiological features of all cases were collected from patient's record. The diagnosis was made in all cases on histopathological examination of biopsy material.

After routine processing of biopsy by fixing, dehydration and clearing followed by impregnation with wax, the sections were taken and stained with hematoxylin and eosin. The sections were studied for typing of brain tumors. Immunohistochemistry was done at higher center as and when required.

## Results

During 2 years of retrospective study total 54 cases of brain tumors were included. In our study Astrocytoma 16 (29.6%) was the most common brain tumor followed by meningioma 15 (27.8%) as shown in Figures 1 to 5. Patients age range from 2 years to 75 years with mean age of 45.5 years and majority of tumors are seen in age group of 41-50 years (Table 1). Male to female ratio of brain tumors in our study is 1:1 (Table 2). Frontal lobe was the most common site of brain tumor in our study (Fig. 6) while headache was the most common symptom of presentation of brain tumors (Table 3).

**Table 1:** Age-wise distribution of brain tumors

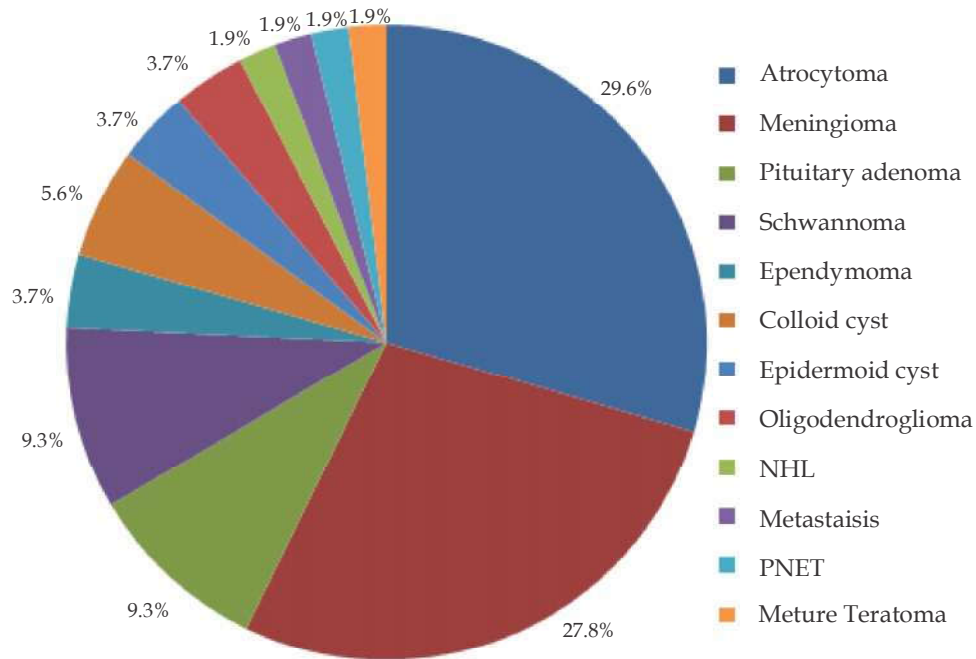
	0-10 yr	11-20 yr	21-30 yr	31-40 yr	41-50 yr	51-60 yr	>60 yr	Total
Astrocytoma	1 (6.3%)	1 (6.3)	2 (12.5)	1 (6.3)	2 (12.5)	4 (25)	5 (31.3)	16 (29.6)
Meningioma	0 (0%)	0 (0)	2 (13.3)	2 (13.3)	4 (26.7)	3 (20)	4 (26.7)	15 (27.8)
Pituitary adenoma	0 (0%)	0 (0)	1 (20)	1 (20)	2 (40)	0 (0)	1 (20)	5 (9.3)
Schwannoma	0 (0%)	0 (0)	1 (10)	2 (40)	1 (20)	0 (0)	1 (20)	5 (9.3)
Ependymoma	0 (0%)	1 (50)	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	2 (3.7)
Colloid cyst	0 (0%)	0 (0)	1 (33.3)	1 (33.3)	1 (33.3)	0 (0)	0 (0)	3 (5.6)
Epidermoid cyst	0 (0%)	0 (0)	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)	2 (3.7)
Oligodendroglioma	0 (0%)	0 (0)	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)	2 (3.7)
NHL	0 (0%)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	1 (1.9)
Metastasis	0 (0%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	1 (1.9)
PNET	0 (0%)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	1 (1.9)
Mature teratoma	0 (0%)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1.9)
Total	1 (1.9%)	2 (3.7)	9 (16.7)	9 (16.7)	13 (24.1)	8 (14.8)	12 (22.2)	54 (100)

**Table 2:** Sex-wise distribution of brain tumors

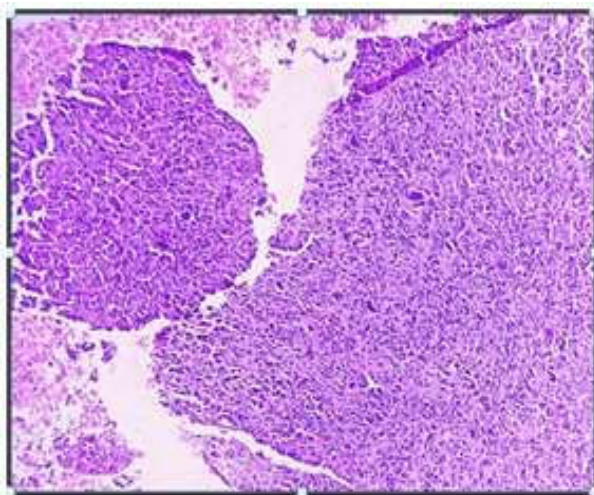
Histopathological diagnosis	Female	Male	Total
Astrocytoma	3 (11.1)	13 (48.1)	16 (29.6)
Meningioma	11 (40.7)	4 (14.8)	15 (27.8)
Pituitary adenoma	3 (11.1)	2 (7.4)	5 (9.3)
Schwannoma	2 (7.4)	3 (11.1)	5 (9.3)
Ependymoma	2 (7.4)	0 (0)	2 (3.7)
Colloid cyst	1 (3.7)	2 (3.7)	3 (5.6)
Epidermoid cyst	1 (3.7)	1 (3.7)	2 (3.7)
Oligodendroglioma	1 (3.7)	1 (3.7)	2 (3.7)
NHL	1 (3.7)	0 (0)	1 (1.9)
Metastasis	1 (3.7)	0 (0)	1 (1.9)
PNET	0 (0)	1 (3.7)	1 (1.9)
Mature teratoma	1 (3.7)	0 (0)	1 (1.9)
Total	27 (100)	27 (100)	54 (100)

**Table 3:** Distribution of cases according to symptoms

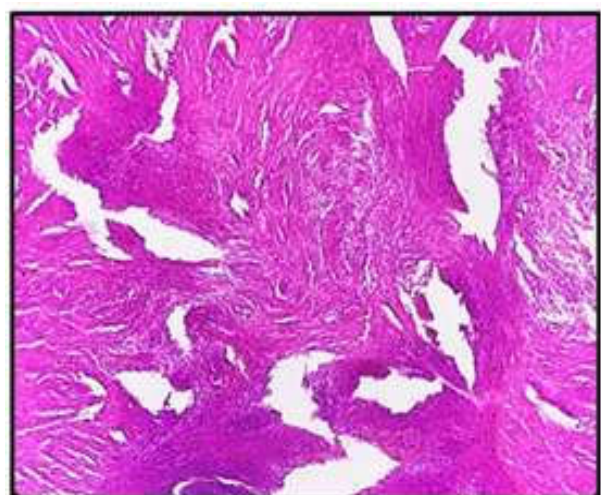
Sl. No.	Symptoms	Number of cases
1.	Headache	34
2.	Vomiting	13
3.	Difficulty in movement / limb weakness	11
4.	Vertigo	10
5.	Seizures	10
6.	Visual defect	8
7.	Mental change	4
8.	Facial paresis	3



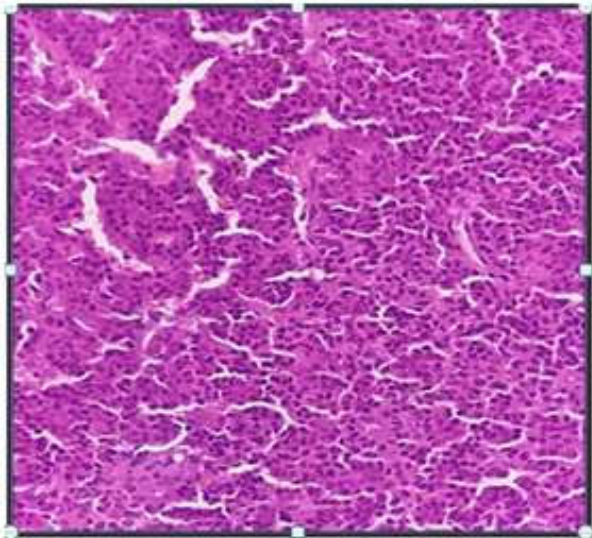
**Fig. 1:** Distribution of different histopathological diagnosis of brain tumors.



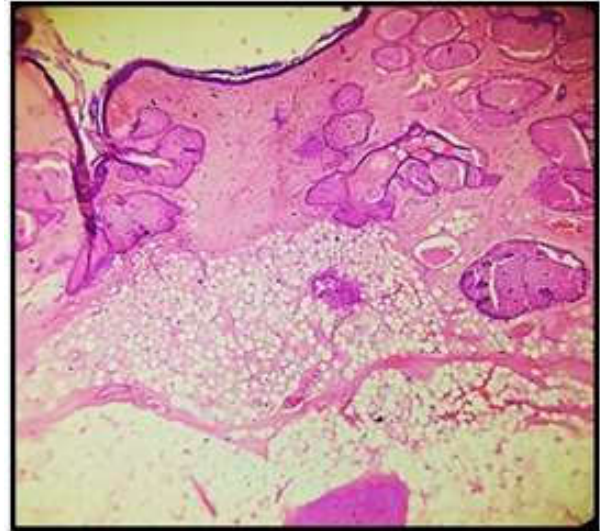
**Fig. 2:** Tumor cells arranged in sheets with giant cells- Glioblastoma grade IV; H&E X100.



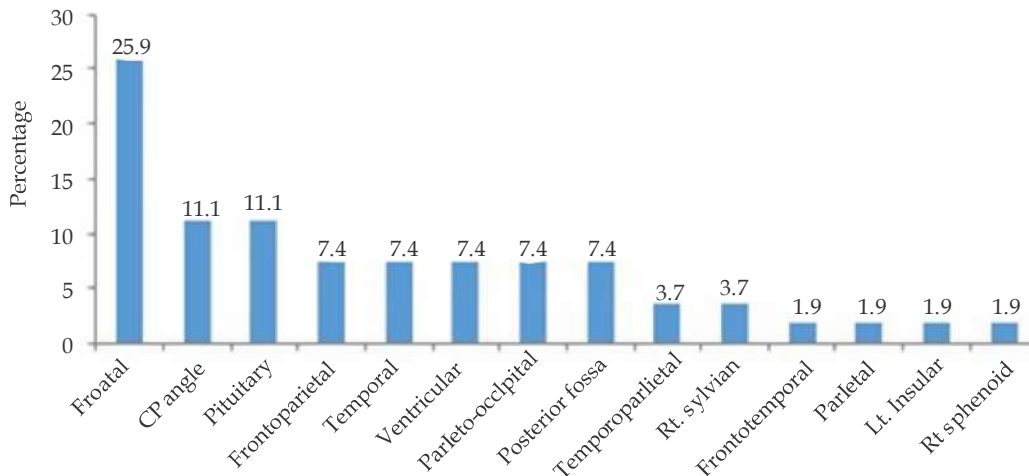
**Fig. 3:** Tumor cells arranged in whorling pattern- Fibroblastic Meningioma; H&E X100.



**Fig. 4:** Monomorphic uniform tumor cells- Pituitary adenoma; H&E X100.



**Fig. 5:** Monomorphic uniform tumor cells- Mature teratoma; H&E X100.



**Fig. 6:** Sitewise distribution of brain tumors

**Discussion**

Brain tumors appear to show an increasing trend over past 30 years, but the rise probably results mostly from new diagnostic imaging techniques.<sup>1</sup> Exact cause of CNS tumors is not defined yet but majority of them are sporadic, few heritable genetic syndromes and prior ionizing radiation exposure associated.<sup>2</sup>

All the CNS tumors were divided into seven categories: tumors of neuroepithelial tissue; tumors of cranial and paraspinal nerves; tumors of meninges; lymphomas and hematopoietic neoplasms; germ cell tumors; tumors of sellar region and metastatic tumors.<sup>3</sup>

The WHO classification offers a crude histological grading system in which each CNS tumor is

classified as Grade I to IV according to its degree of malignancy.<sup>4</sup>

The fourth edition of the WHO classification of CNS tumors, published in 2007 lists several new entities, including angiocentric glioma, papillary glioneuronal tumor, rosette forming glioneuronal tumor of fourth ventricle, papillary tumor of pineal region, pituicytoma and spindle cell oncocyoma of the adenohypophysis.<sup>5</sup>

The exact histopathological diagnosis of CNS tumors using newer diagnostic criteria, techniques like immunohistochemistry (IHC) has played major role in differential diagnosis and improving diagnostic accuracy which is essential to predict the grading and prognosis.<sup>6</sup>

Several factors impede the systematic study of epidemiology of CNS tumors. These include the



distinct clinicopathological entities grouped under this general heading and their different etiological factors, difficulty in obtaining diagnostic material for intracerebral and intraspinal lesions and fact that even low-grade lesions may have dramatic consequences for the patients.<sup>7</sup>

Bimodal age of CNS tumors is reported, one in children and other in adults. The peak incidence of CNS tumors in our study is observed between 41 and 50 years with a mean age of 45.5 years similar to the other studies done by Kanthikar et al.<sup>6</sup> and Masoodi et al.<sup>2</sup> whereas Hamdani et al.<sup>16</sup> noted peak incidence in sixth decade (51–60 years).

In our study male to female ratio was 1:1 which was in contrast to previously done studies, in which males are affected more with CNS tumors than females with an exception that meningiomas occurring more in females.<sup>11-13</sup> In our study we also found female predominance in meningioma cases. This difference in present study can be possible due to fewer numbers of cases presenting in our center.

In the present study astrocytoma was the most common CNS tumor followed by meningioma which is in concordance with the studies done by Aryal G et al.<sup>5</sup>, Khaled R Zalata et al.<sup>8</sup> and Mondal et al.<sup>9</sup> However in studies done by Ghanghoria S et al.<sup>10</sup> and Thambi R et al.<sup>7</sup> showed higher incidence of meningioma followed by astrocytomas which was in contrary to our study.

Most common site of involvement in brain tumors was frontal lobe noted in our study which is same as in studies done by Torres et al.<sup>14</sup> and Jalali and Dutta et al.<sup>15</sup> Most of the patients in our study presented with complaint of headache which is also the most common symptom in other studies.<sup>5,7,16</sup>

## Conclusion

CNS tumors are a heterogeneous group of tumors comprising of various morphological types and with different outcomes. The present study determines the disease burden in our area. Further more studies are required for correlating and merging this data with other tertiary care centres in our region and the exact disease prevalence in southern Rajasthan.

## Acknowledgments

The authors would like to acknowledge the clinical colleagues and technical staff in the Histopathology laboratory at Pacific Medical College and Hospital, Udaipur.

## Key messages

According to our study astrocytoma is the most common brain tumor that occurs sporadically in the age group of 41–50 years. Males are more affected than females, except for meningioma. Furthermore studies are required in our area to get appropriate analysis.

## References

1. Mehta J, Bansal B, Mittal A, et al. Histological Analysis of Primary Brain Tumors in a Tertiary Care Hospital: A Retrospective Study of 5 Years. *Int J Med Res Prof* 2017 Sept;3(5):14–18.
2. Masoodi T, Gupta RK, Singh JP, et al. Pattern of Central Nervous System Neoplasms: A Study of 106 Cases. *JK practitioner* 2012;17(4):42–46.
3. Joel Dhanpandian S, Johnsy Merla J. *IOSR-JDMS* 2017;16(2):42–47.
4. Nibhoria S, Tiwana KK, Phutela R, et al. Histopathological Spectrum of Central Nervous System Tumors: A Single Centre Study of 100 Cases. *International Journal of Scientific Study* 2015;3(6):130–34.
5. G Aryal. Histopathological pattern of central Nervous system tumor: A three-year retrospective study. *Journal of Pathology of Nepal* 2011;1:22–25.
6. Kanthikar SN, Nikumbh DB, Dravid NV. Histopathological overview of central nervous system tumors in North Maharashtra, India: a single center study. *Indian Journal of Pathology and Oncology* 2017;4(1):80–84.
7. Thambi R, Kandamuthan S, Sainulabdeen S, Vilasinamma L, Abraham TR, Balkrishnan PK. *JCDR* 2017;11(6):EC05–EC08.
8. Khaled R Zalata, Dina A El-Tantawy, Azza Abdel-Aziz, et al. Frequency of central nervous system tumors in delta region, Egypt; *Indian Journal of Pathology and Microbiology* 2011;54(2):299–306.
9. Mondal S, Pradhan R, Pal S, et al. Clinicopathological pattern of brain tumors: A 3 year study in a tertiary care hospital in India. *Clin Cancer Investig J* 10.2016;5:437–40.
10. Ghanghoria S, Mehar R, Kulkarni CV, et al. Retrospective histological analysis of CNS tumors – A 5 year study. *Int J Med Sci Public Health* 2014;3:1205–07.
11. Rohinger M, Sutherland GR, Louw DF, et al. Incidence and clinicopathological features of meningioma. *Journal of Neurosurgery* 1989 Nov; 71(5):665–72.
12. Hadidy AM, Nadi MM, Ahmad TM, et al. Descriptive epidemiological analysis, MRI signals intensity and histopathological correlations of

- meningiomas. *Neurosciences (Riyadh)* 2010 Jan; 15(1):11-4.
13. Das A, Chapman CAT, Yap WM. Histological subtypes of symptomatic central nervous system tumors in Singapore. *J Neurol Neurosurg Psychiatry*. 2000 Mar; 68(3): 372-74.
  14. Torres LF, Almeida R, Avila S, et al. Brain tumors in south Brazil: A retrospective study of 438 cases. *Arq Neuropsiquiatr* 1990 Sep;48(3):279-85.
  15. Jalali R, Datta D. Prospective analysis of incidence of central nervous system tumors presenting in a tertiary cancer hospital from India. *J Neurooncol* 2008 Mar;87(1):111-4.
  16. Hamdani SM, Dar NQ, Reshi R. Histopathological spectrum of brain tumors: A 4-year retrospective study from a single tertiary care facility. *Int J Med Sci Public Health* 2019;8(8):673-76.

