

Clinicopathological pattern of brain tumors: A 3-year study in a tertiary care hospital in India

Sajeeb Mondal, Rajashree Pradhan, Subrata Pal, Biswajit Biswas, Arindam Banerjee¹, Debosmita Bhattacharyya²

Departments of Pathology and ¹Pediatrics, College of Medicine and Sagore Dutta Hospital, ²Department of Pathology, R. G. Kar Medical College and Hospital, Kolkata, West Bengal, India

ABSTRACT

Background: Brain tumors are heterogeneous group of neoplasms, affecting different age groups. Although some studies have been published regarding pathological pattern of brain tumors from different countries of the world and also from India, comprehensive clinicopathological studies from Eastern India is lacking. **Aims:** The aim of this study was to observe recent incidence of different brain tumors and to study clinical and histopathological spectrum of brain tumors in Eastern India. **Materials and Methods:** The present study was a cross-sectional observational study involving 130 cases of brain tumors which were diagnosed during the 3-year study period (January 2010–December 2012). Data regarding clinical presentation and radiological features of all cases were collected from all patients. Histopathological diagnosis was correlated with clinical and radiological diagnosis. **Results:** We found 130 cases of brain tumor with a male preponderance. The cases were distributed in a wide age range from 4 years to 78 years with the mean age of 42.38 years. Most common tumor type in our study was neuroepithelial tumor (92 cases, 70.76%). Among the neuroepithelial tumors, most frequent subtype was astrocytic tumor (54 cases, 41.5%). The second most frequent brain tumor was meningioma (20 cases, 15.3%). We found higher incidence of oligodendroglial tumor (8.46%) and medulloblastoma (7.69%) in our series. **Conclusion:** Males are more predispose to brain tumors in comparison to females. Astrocytic tumors are most common subtype in Eastern India. However, the WHO Grade I neoplasms are more frequent brain tumors.

Key words: Astrocytic tumors, brain tumors, histopathological subtypes, incidence

INTRODUCTION

Brain tumors are heterogeneous group of neoplasm, which include both benign and malignant cases.^[1] Brain tumors constitute only <2% of all neoplasms.^[1,2] Male patients are more affected than female cases except in meningioma. Brain tumors have bimodal age distribution with a peak at childhood and adult age group of 45–70 years.^[1] Nearly 20% of childhood malignancies are brain tumors and 70% of primary brain tumors of childhood are infratentorial and involve cerebellum, midbrain, pons, and medulla.^[3] Clinical

presentation of brain tumors depends on the location, size of the tumors, and growth rate of the neoplasm.^[1] There is a high morbidity and mortality in these tumors irrespective of their histological grade.^[4] The primary brain tumors involve about two-third of all central nervous system (CNS) neoplasms.^[5] According to the WHO classification, CNS tumors have extensive classification and subtypes. Glial tumors are the most common type of brain tumor and include astrocytoma, ependymoma, glioblastoma, oligodendroglioma, and others.^[1,6] Nonglial tumors include embryonal tumors, choroid plexus tumors, pineal tumors, meningeal tumors, nerve sheath tumors, tumors of sellar region, hematopoietic neoplasm, and metastatic tumors.^[6] Among these extensive entities, meningiomas, gliomas,

Address for correspondence: Dr. Subrata Pal, Kalpataru Apartment, Sahid Colony, BT Road, P.S. Khardaha, North 24 Parganas, West Bengal, India.
E-mail: subratapal1985@gmail.com

Access this article online

Quick Response Code:



Website:

www.ccij-online.org

DOI:

10.4103/2278-0513.197861

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

Cite this article as: Mondal S, Pradhan R, Pal S, Biswas B, Banerjee A, Bhattacharyya D. Clinicopathological pattern of brain tumors: A 3-year study in a tertiary care hospital in India. *Clin Cancer Investig J* 2016;5:437-40.

nerve sheath tumors, and pituitary tumors account more than 85% of all CNS tumors.^[6] Accurate diagnosis of brain tumors requires sophisticated modern noninvasive and invasive techniques such as radiological imaging, intraoperative squash cytology, postsurgical biopsy, and histopathology of the tumors. Here, we focused the on descriptive epidemiology of different brain tumors and clinicopathological features and types of brain tumors in a tertiary care hospital in Eastern India.

MATERIALS AND METHODS

The present study was done at the Department of Pathology in collaboration with the Department of Neurosurgery in our hospital from June 2008 to May 2011. Ethical clearance was obtained from the Institutional Ethics Committee. In the 3-year study period, we studied 130 brain tumor cases. Data on clinical presentation and radiological features of all cases were collected from the patients' records. In all cases, gross features were recorded during grossing of the resected tumors. The tissue sections were processed and stained as standard procedure. Squash cytology and immunohistochemistry were used in atypical cases and in the cases it was required. Histopathological diagnosis was done depending on the WHO classification and grading (2007). Statistical analysis was performed using Statistical Package for Social Science (SPSS, Version 20 window 8). Relative frequency of different types of brain tumors and grading was analyzed.

RESULTS

We studied 130 cases of brain tumors in 3 years. We found 73 (56.15%) male patients and 57 (43.84%) female cases. The cases were distributed in a wide age range (lowest - 4 years and highest - 78 years) in our series with the mean age of 42.38 years. The age distribution of CNS tumors is shown in Figure 1. The highest number of cases was among 41–50 years (38 cases, 29.23%). Most common presentation of brain tumor in our series was headache (63 cases, 48.46%). Other symptoms were seizure (48 cases, 36.92%), vomiting (32 cases, 24.61%), visual disturbance (11 cases, 8.46%), cranial nerve palsy (8 cases, 6.15%), and gate disturbance (5 cases, 3.84%) [Table 1]. According to the sites of involvement, frontal lobe was most common site (44 cases, 33.84%). We found 12 (9.23%) cases of cerebellar tumor in our study.

Most of the tumors in our series were neuroepithelial tumor (92 cases, 70.76%). Among the neuroepithelial tumors, most frequent type was astrocytic tumor (54 cases, 41.5%). The second most frequent group was meningioma (20 cases, 15.3%) [Figure 2]. Histopathological subtypes of brain tumors are shown in Table 2. Among the

astrocytic tumors [Figure 3], 13 cases were WHO Grade I and 6 cases were Grade II. Another 12 (22.22%) cases of astrocytoma were WHO Grade III and 23 (42.5%) cases were glioblastoma (Grade IV). We found 9 (6.92%) cases of nerve sheath tumors (eight cases of schwannoma and one case of neurofibroma) in our series. All of brain tumors of pediatric

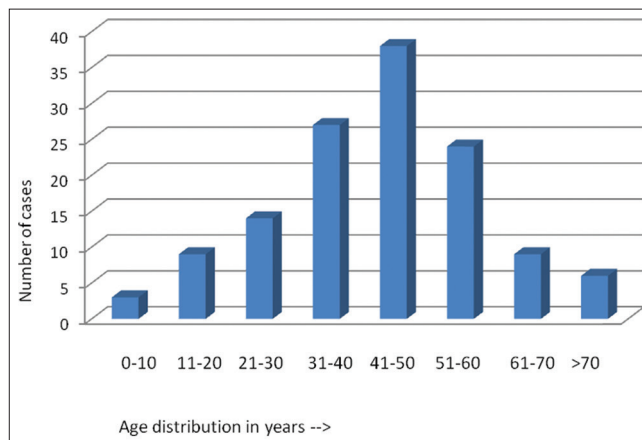


Figure 1: Age distribution of brain tumor cases

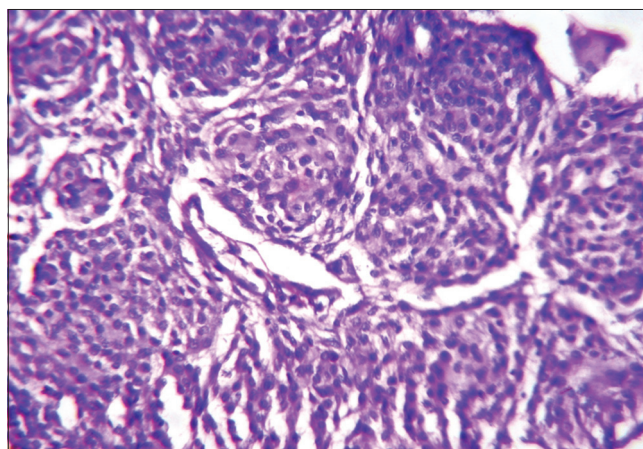


Figure 2: Histopathology of meningioma – whorled benign meningothelial cells having bland oval nuclei (H and E, ×40)

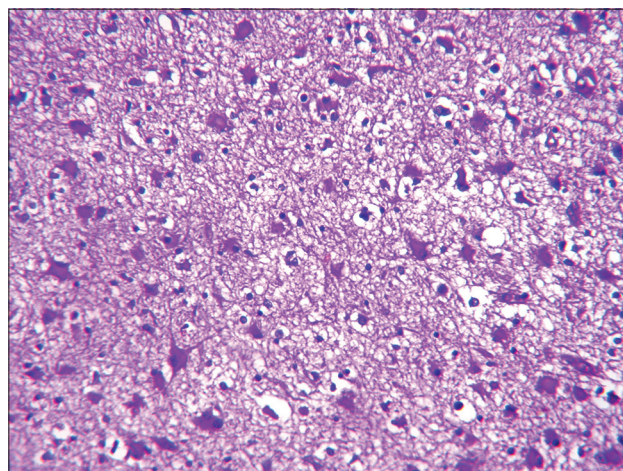


Figure 3: Histopathology of astrocytoma (H and E, ×10)

Table 1: Clinical presentations of brain tumors

Clinical presentations	Number of cases (%)
Headache	63 (48.46)
Seizure	48 (36.92)
Vomiting	32 (24.61)
Visual disturbances	11 (8.46)
Gait disorder	5 (3.84)
Cranial nerve palsy	8 (6.15)

Table 2: Spectrum of histopathology subtypes of diagnosed brain tumors (n=130)

Types of brain tumor	Subtypes/specific diagnosis	n (%)
Neuroepithelial tumors	Astrocytic tumors	54 (41.5)
	Oligodendroglial tumor	11 (8.46)
	Ependymal tumors	5 (2.3)
	Choroid plexus tumors	3 (2.3)
	Neuronal tumor (Lhermitte-Duclos)	1 (0.76)
	Neuroblastic tumor	7 (5.3)
	Pineoblastoma	1 (0.76)
Nerve sheath tumors	Embryonal tumor	10 (7.6)
	Schwannoma	8 (6.1)
Meningeal tumor	Neurofibroma	1 (0.76)
	Meningioma	20 (15.3)
Lymphoma	Primary central nervous system lymphoma	1 (0.76)
Germ cell tumor	Germinoma	1 (0.76)
Tumor of seller region	Craniopharyngioma	2 (1.53)
	Pituitary adenoma	3 (2.3)
Metastatic tumor	Adenocarcinoma	2 (1.53)

age group were embryonal tumors (three cases, 2.3%). We found one primary CNS lymphoma and two metastatic brain tumor in our series.

DISCUSSION

Among the 130 cases of brain tumor in our study, we found 65 (50%) cases in the group of 31–50 years. Peak age group in our study was 40–50 years, accounting 38 (29.23%) cases. Our finding was similar to the finding of Masoodi *et al.* and Dhar *et al.*^[1,7] Male versus female ratio in the present study was 1.28:1, but meningioma cases had a female predominance. Masoodi *et al.*, Ghanghoria *et al.*, and Yeole found similar sex ratio in their studies.^[1,8-10] Lee *et al.* found six types of brain tumors occurred more frequently in females than males (female:male - 1.43:1).^[11] We found frontal lobe as most common site of brain tumors in our study, similar to the finding of Masoodi *et al.*, Jamal *et al.*, and Jalali *et al.*^[1,12,13]

Most common symptom in the patients in our study was headache (63 cases, 48.46%). Headache was also found to be the most common complaint in previous studies.^[1,7] Neuroepithelial tumor was most common tumor (92 cases, 70.76%) and astrocytoma was the most common subtype (54 cases, 41.5%) in the present study, supporting the previous studies by Aryal, Masoodi *et al.*,

Jalali and Datta, and Ahmed *et al.*^[1,6,13,14] However, Dhar *et al.* found glioblastoma as the most common subtype in their series.^[7] Meningiomas (20 cases, 15.3%) were the second common type CNS tumor in our series, similar to the findings of other previous studies.^[1,6,10,11] However, Ghanghoria *et al.*, Das *et al.*, and Lee *et al.* found meningioma as the most common lesion in their study group.^[8,9,11] Among the astrocytic tumors, most common type was WHO Grade IV (glioblastoma) accounting 42.59% of cases. Dhar *et al.*, Ghanghoria *et al.*, and Ahmed *et al.* also found similar findings in their series.^[7,8,14] Both the cases of metastatic tumor were adenocarcinoma. One case was metastasis from colonic adenocarcinoma, and another was secondary from ductal carcinoma of breast. Aryal found eight cases of metastatic brain tumor and 87.5% (seven cases) of these were adenocarcinoma.^[6] We diagnosed 3 cases of pituitary adenoma (2.3%) in the present study whereas Das *et al.* and Masoodi *et al.* found higher incidence.^[1,9] We found higher incidence of oligodendroglial tumor (8.46%) and medulloblastoma (7.69%) in our series than others.^[1,14,15] We found only one (0.76%) case of primary CNS lymphoma in the present study. Previous studies found incidence of CNS lymphoma from 0.8% to 1.5% in different series.^[1,16]

CONCLUSION

Various morphological types of brain tumors occur at different age groups. Histopathological diagnosis is necessary for the formulation of further management after neurosurgery. Our study gives a current outlook of epidemiology and clinicopathological aspects of different brain tumors.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Masoodi T, Gupta RK, Singh JP, Khajuria A. Pattern of central nervous system neoplasm: A study of 106 cases. *JK Pract* 2012;17:42-6.
- Stewart BW, Kleihues P. Tumor of the nervous system. In: *World Cancer Report*. Leon, France: IARC Press; 2003.
- Molla N, Baki A, Afzal N, Hossen A. Clinical and pathological characteristics of brain tumor. *Bangabandhu Sheikh Mujib Med Univ J* 2010;3:68-71.
- Enow Orock GE, Enoh Nkongho K, Eyenga VC, Verla V, Mengot BE. Brain tumours: Clinicopathologic aspects of 40 cases seen in Cameroon and review of the literature. *Afr J Integr Health* 2015;5:18-23.
- Monga K, Gupta VK, Gupta S, Marwas K. Clinicopathological study and epidemiological spectrum of brain tumours in Rajasthan. *Indian J Basic Appl Med Res* 2015;5:728-34.

6. Aryal G. Histopathological pattern of central nervous system tumor: A three year retrospective study. *J Pathol Nepal* 2011;1:22-5.
7. Dhar A, Bhat AR, Nizami FA, Kirmani AR, Zargar J, Ramzan AU, *et al.* Analysis of brain tumors in Kashmir Valley - A 10 year study. *Bangladesh J Med Sci* 2014;13:268-77.
8. Ghanghoria S, Mehar R, Kulkarni CV, Mittal M, Yadav A, Patidar H. Retrospective histological analysis of CNS tumors – A 5 year study. *Int J Med Sci Public Health* 2014;3:1205-7.
9. Das A, Chapman CA, Yap WM. Histological subtypes of symptomatic central nervous system tumours in Singapore. *J Neurol Neurosurg Psychiatry* 2000;68:372-4.
10. Yeole BB. Trends in the brain cancer incidence in India. *Asian Pac J Cancer Prev* 2008;9:267-70.
11. Lee CH, Jung KW, Yoo H, Park S, Lee SH. Epidemiology of primary brain and central nervous system tumors in Korea. *J Korean Neurosurg Soc* 2010;48:145-52.
12. Jamal S, Moghal S, Mamoon N, Mushtaq S, Luqman M, Anwar M. The pattern of malignant tumours: Tumour registry data analysis, AFIP, Rawalpindi, Pakistan (1992-2001). *J Pak Med Assoc* 2006;56:359-62.
13. Jalali R, Datta D. Prospective analysis of incidence of central nervous tumors presenting in a tertiary cancer hospital from India. *J Neurooncol* 2008;87:111-4.
14. Ahmed Z, Muzaffar S, Kayani N, Pervez S, Husainy AS, Hasan SH. Histological pattern of central nervous system neoplasms. *J Pak Med Assoc* 2001;51:154-7.
15. Patty IS. Central nervous system tumors: A clinicopathological study. *J Dohuk Univ* 2008;11:173-9.
16. Miller DC, Hochberg FH, Harris NL, Gruber ML, Louis DN, Cohen H. Pathology with clinical correlations of primary central nervous system non-Hodgkin's lymphoma. The Massachusetts General Hospital experience 1958-1989. *Cancer* 1994;74:1383-97.