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An Observational Study To Evaluate Histopathological Spectrum of Primary Brain Tumors In Tertiary Care Hospital In Western Rajasthan

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Conflict of interest: Nil Abstract

ABSTRACT

Background: Central nervous system (CNS) tumors are most dreaded form of cancer with high mortality and morbidity . (1)CNS tumors comprises of less then 2.1 % of all malignancies.[2]. In India ,tumors of CNS constitute about 1.9 % of all tumor .[3].However , a rising global trend in these tumors has been observed over the years with newly identified potential risk factors like genetic mutation and ionizing radiation exposure etc. Despite of great advancement of ancillary studies ,histopathological grading is a means of predicting the biological behaviour of neoplasm. That's why histopathological examination is the corner ston upon which the treatment strategy depends. Tumor grade and associate genetic mutation with molecular marker influencing the choice of therapies and predict the response of therapy and outcome.

Aim: The aim of present study is to know prevalence of different histological types and grades of primary brain tumors in a single tertiary care centre . Identify the age distribution , gender distribution ,topography and different histological types along with WHO grading of CNS tumors .

Study Design: One year Prospective study.

Material and Method: It was a prospective study carried out in department of pathology ,Dr S.N. Medical College Jodhpur from October 2021 to December2022. Total 94 cases of CNS tumors were included in this study. The tissues were processed and stained with routine haematoxylin and eosin and finally histopathological examination was done by light microscopy . CNS tumors were classified according to WHO 2016 Morphological classification and simultaneously WHO grading was done. The data was analyzed using excel and SPSS software.

Results: 94 cases were analyzed during a study period of 1 years. Male preponderance was observed with 52 males and 42 females with M: F ratio is 1.23:1. A wide age group ranging from 4 to 85 years were affected. Overall mean age was 38.58 years. Maximum cases were recorded between 20- 40 years of age. Majority of lesions were presented as space occupying lesion (85 cases ,90 %). WHO Grade I tumors was predominant 40 cases ,42.55 %). Glial tumors having maximum percentage (33 cases ,35.10 %)followed by meningeal tumors (32 cases (34.04%). Meningothelial meningioma was most common histological type of all type of meningioma.

Conclusion: The present study provides information regarding the burden of disease in our area. In developing countries like India due to lack of complete registration of newly diagnosed cases with local cancer registries ,the exact tumor burden goes unnoticed. Hospital based prevalence data therefore estimating tumor burden and making appropriate infrastructure in management of these cancers with newer diagnostic as well as therapeutic treatment modalities.

Keywords: Central Nervous System Tumors , Western Rajasthan

Introduction

A brain tumour is a severe health condition and can be fatal if detected and treated late .The occurrence of brain tumours in India is slowly peaking and more cases of primary brain tumours are recorded every year among the peoples of different age groups primarily because emergence of newly identifiable risk factors. Recently the International Agency for Reasearch on cancer classified overexposure to low frequency ,non ionizing electromagnetic waves through mobile phones as possible carcinogen to human beings, and a potential risk factor for brain tumors such as glioma , meningioma , acoustic neuroma .[4].

The International Association of Cancer Registries (IARC) states that there are around 28000 cases of brain cancer reported in India every year and alarmingly 24000 people die due to brain tumours annually. CNS neoplasm broadly classified as Gliomas, Ependymal tumors ,Choroid plexus tumors, CNS embryonal tumors ,Cranial and Paraspinal nerve tumors, Meningeal tumors ,Mesenchymal ,Non meningothelial tumors,

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Hematolymphoid, Tumors of sellar origin and CNS metastasis.(5).

Clinical sign symptom of cns tumors depends on the site of tumor,biological behavior and aggressiveness of tumor with rate of growth .With the advent of new diagnostic techniques like CT scan and MRI particularly T1 weighted MRIs with gadolinium enhancement and

T2 Weighted (FLAIR) studies allow assessment of vascular integrity, edema or invasion patterns respectively.

The prognostic evaluation and the therapeutic strategies for patients depend on the synthesis of histological diagnosis, malignancy grade, gene-molecular profile. radiological images, surgical resection and clinical findings (age, tumour location, and "performance status").

The World Brain Tumor day is observed every year On June 8 ,to raise awareness about brain tumors and their treatment as well as to eliminate stigma associate with people who suffer from them. The theme for world brain tumor Day 2022 is **Together we are stronger".**

Material & Methods

It was a prospective study, carried out at Department of Pathology, Dr S.N. Medical College jodhpur in collaboration with department of neurosurgery M.D.M Hospital ,Jodhpur during the period of October 2021 to December 2022. A total of 94 cases of brain tumor which were confirmed histopathologically included in study after applying inclusion and exclusion criteria. Inadequate and autolyzed tissue samples were excluded from the study. All the relevant information ,ie. Age ,sex , nature of specimen , radiological findings along with all clinical details were collected from requisition form for study purpose. The tissues were processed and stained with routine hematoxylin and eosin and finally histopathological examination under light microscope was carried out. Different parameters like percentage, mean were calculated using SPSS software. Ethical clearance for the study was taken from the Institutional ethical committee Dr S.N Medical College and Associated hospital ,Jodhpur.

Inclusion criteria:

1. All the received brain biopsies in department of pathology from M.D. M Hospital neurosurgical department during the period from October 2021 to Dec 2022 included in the study irrespective of age and sex of the patient.

Exclusion criteria:

1. Autolysed/ unfixed biopsy tissue specimens were excluded from the study.
2. CNS infections
3. Non neoplastic cystic lesions
4. Metastatic malignancies were excluded from study.

Statistical Analysis: Data were collected and tabulated as shown in the results. Statistical analysis was done using Microsoft Excel. Frequency and percentage of each parameter were calculated and analysed.

Results

The spectrum of neoplastic lesions were astrocytoma ,glioblastoma ,ependymoma , meningioma ,oligodendroglioma ,pituitary adenoma , central neurocytoma ,choroid plexus papilloma ,schwanoma medulloblastoma ,pilomyxoid astrocytoma ,craniopharyngioma hemangioblastoma.

A total 94 cases of Primary brain tumors was analysed during the study period of one year .

The Primary CNS tumors were graded from Grade I to Grade IV. Majority of CNS tumors presented as Space occupying lesion in the brain (85 cases ,90%) , Only 9 cases (10%) were intraspinal tumors ,similar observation is made by K. Anantha sathiya et al. (6)Most common associated complain was headache . In our study 15 cases of paediatric tumors were found among which astrocytic tumors most frequent results are similar with Chilukuri et al (7)

Comparative Analysis Of Brain tumors :

Age Incidence

In the present study, the affected age range was 4 to 85 years. Overall mean age was 38.58 years ; the maximum cases were noted between 20- 40 years of age. This is in concordance to the study conducted by Krishnatreya et al. Khonglah et al (8) who found the age group of 20-39 years affected predominantly.

Sex Incidence

In the present study, overall, male predominance was seen with sex ratio of 1.23:1. In the study done by Nibhoria et al.[9], Masoodi et al.[10] Preeti et al.[11] males were commonly affected than females with sex ratio of 1.2 :1, 1.12:1, and 1.13:1 respectively, which is concordant with the present study. Overall all the CNS tumors are found more common in male except meningioma .Result are compared with similar findings of Shubham et al (12) and Yeole et al.(13)

Grade of tumor

Out of all the tumors for which World Health Organization (WHO) grading was done, Highest was WHO grade I (40 cases, 42.55%) followed by Grade II (19 cases ,20.21 %), compared with Vimal S et al(14) and Mehta et al[15] found Grade I tumors commonest followed Grade II.

Histological type

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Glial tumors having highest percentage (33 cases ,35.10 %)followed by meningeal tumors (32 cases ,34.04%). Among the meningeal tumors Meningothelial meningioma was commonest similar result was observed by Dhar et al (16)and Debadrita et al. (17)

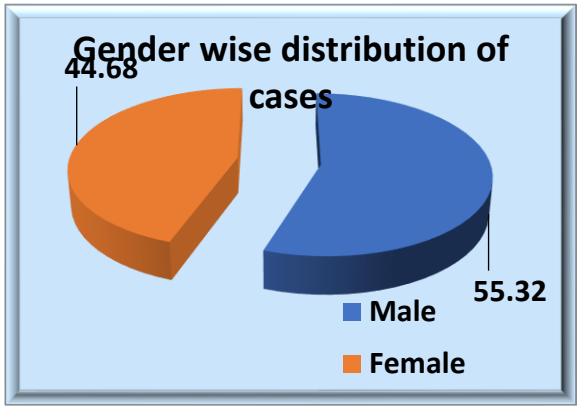

Chart 1 ; Sex distribution of cases

Conclusion

CNS tumors are heterogenous group of tumors comprising of various morphological types .Rising global trends in the incidence of CNS tumors have been observed irrespective of age. Histopathological examination ,WHO grade with molecular and genetic marker helps to make Integrated diagnosis which will be reflected in Layered report structure.Hospital based prevalence data forms the basis for estimating the tumor burden and required health care infrastructure in the management of these cancers with appropriate diagnosis. This can have important connotations in the field of Brain tumor research particularly when analysing the geographical differences in the molecular and genetic profiles which could aid in development of targeted individualised therapies and planning treatment protocols and strategies.

Table 1 : Age distribution of cases in study population

Age (in years)	Number of cases	Percentage
<20	17	18.09
20 – 40	35	37.23
40 – 60	25	26.60
>60	17	18.09
Mean age	38.58±19.27	Median = 33.00

Table 2 : Gender wise distribution of case

Gender	Number of cases	Percentage	Mean age
Male	52	55.32	38.80±18.10
Female	42	44.68	38.30±20.84
Total	94	100%	P=0.901

Table 3 : Tumor grade wise distribution of cases

Grade	Number of cases	Percentage
I	40	42.55
II	19	20.21
III	05	5.32
IV	17	18.09
Schwanoma	10	10.64
Teratoma	01	1.06
Pitutary adenoma	01	1.06
Pilomyxoid astrocytoma	01	1.06

Table 4 : Percentage of different histological types of tumor

Tumor Type	Number of cases	Percentage of cases
Gliomas A. Astrocytic tumors B. Oligodendrocytic tumors C. Mixed Glioma	 21 8 4	35.10
Tumors of meninges A. Meningioma B. Atypical Meningioma	 29 3	34.04
Tumors of peripheral nerves		

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Schwanoma	10	10.63
Tumors of sellar region : Craniopharyngioma Pitutary adenoma	 2 1	3.19
Mesenchymal non meningothelial Hemangioblastoma	2	2.12
Choroid plexus tumors	2	2.12
Germ cell tumor (Teratoma)	1	1.06
Ependymal tumors **Embryonal tumors**	8 3	8.51 3.19

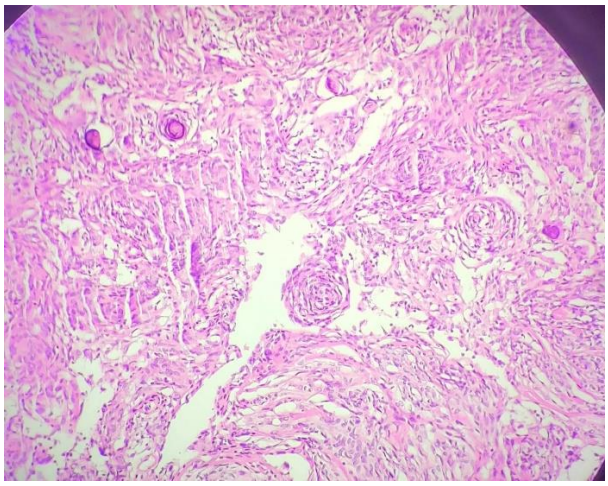

Figure 1: Meningothelial Meningioma :At this low power view, spindly-looking cells with pink cytoplasm run in short fascicles, forming syncytial structures and whorls, better appreciated at the center of the photomicrograph along with psammoma bodies.(H &E 10 X)

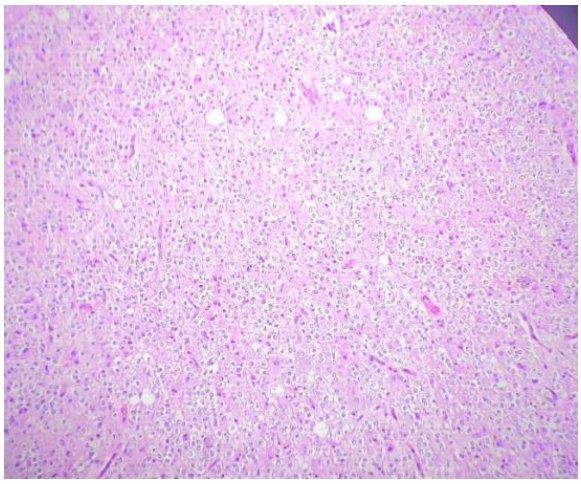

Figure 2: **Oligodendroglioma with fried egg apppearance and anastomosing capillaries giving classic appearance of chicken wire blood vessels.(H& E 10 x)**

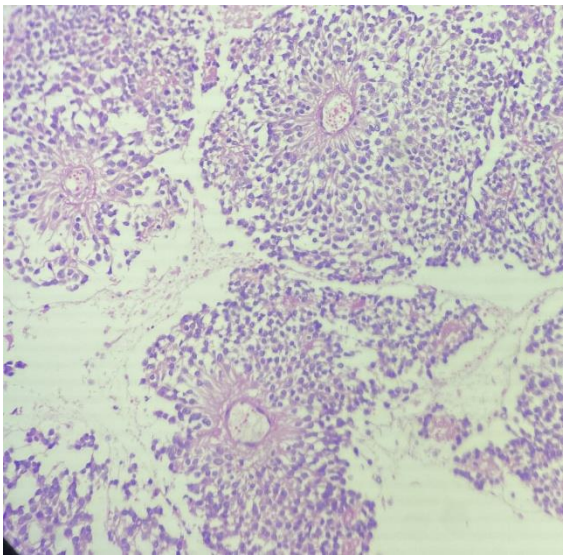

Figure 3: Ependymoma :The tumor cells are arranged around blood vessels creating perivascular pseudorosettes, seen in this image (H & E 40X)

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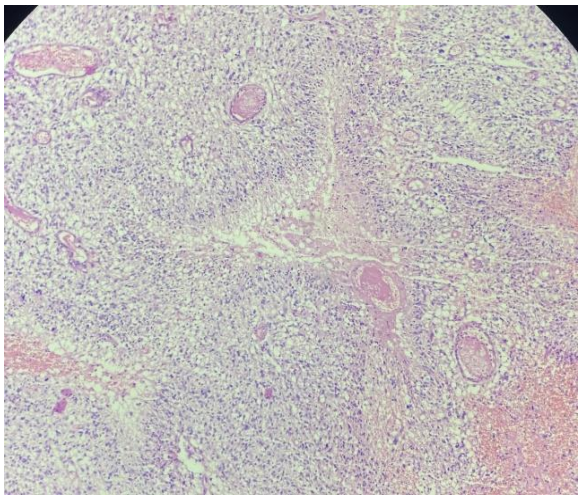

Figure4 : Glioblastoma display **hypercellularity, greater nuclear pleomophism, hyperchromasia, and increased mitotic activity .** Necrotic areas are seen in **serpentine pattern** (shown here) or geographic pattern in hypercellular foci. Tumor cells aggregate around the periphery of necrotic areas creating nuclear **pseudopalisading.**(H & E 10 X)

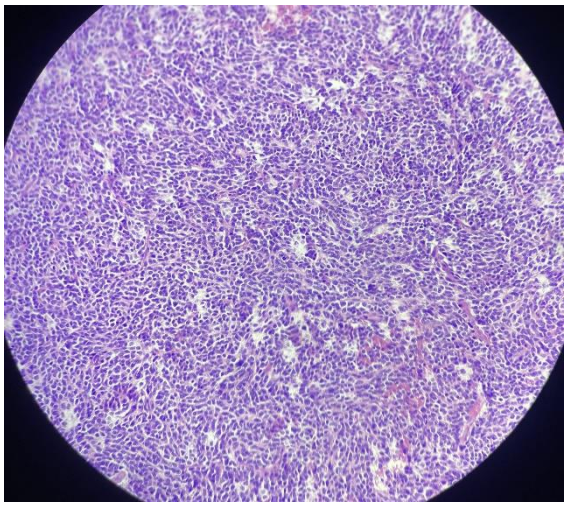

Figure5 : Medulloblastoma have the typical appearance of small round blue cells with high N:C ratio, hyperchromatic nuclei and brisk mitotic activity. (H & E 10X)

Bibliography

1. Lacy J, Saadati H, Yu JB. Complications of brain tumors and their treatment. Hematol Oncol Clin North Am 2012;26:779-96
2. Stewart BW, Kleihues P. Tumors of the Nervous System. In: World Cancer Report. Lyon, France: IARC Press; 2003.
3. Iyenger B, Chandra K. The pattern of distribution of tumors in the brain and spinal cord. Ind J Cancer 1974;11:134-8.
4. Wohrer A. Epidemiology and brain tumors: practical usefulness. Eur Assoc Neurooncol Mag 2013; 3:56-60.
5. 2016 WHO Classification is considered a revision of the 4th edition (Acta Neuropathol 2016;131: 803) .
6. K. Anantha Sathiya .http://dx.doi.org/10.21276 /ijcmr.2022
7. Chilukuri S, Teegala R, Bandarupalli S, Thota A, Aluri A P, Histopathological spectrum of pediatric supratentorial brain tumors in a tertiary care hospital. *Indian J Pathol Oncol* 2019;6(1):137-140
8. Khonglah Y, Shangpliang D, Mishra J, Mustafa A, Kakoti A, Phukan P. Histological spectrum of central nervous systemlesions at a tertiary care center in India. Clin Cancer Investig J. 2020;9:175-81.
9. Nibhoria S, Tiwana KK, Phutela R, Bajaj A, Chhabra S, Bansal S. Histopathological spectrum of central nervous system tumors: a single centre study of 100 cases. Int J Sci Stud. 2015;3(6):130-4.
10. Masoodi T, Gupta RK, Singh JP, Khajuria A. Pattern of central nervous system neoplasms: A study of 106 cases JK-practitioner. 2012;17(4).
11. Preeti Agarwal ,Rashmi Monterio, Indu Choudhary et al.Histopathological spectrum of Brain Tumors in Tertiary Care Teaching Hospitals in Southern Rajasthan .Indian J Pathol Res Pract .2020;9 (1) :65-70
12. Kakshapati T, Basnet RB, Pant B, Gautam D. Histopathological analysis of central nervous system tumors; an observational study. J Pathol Nep 2018;8:1393-98.
13. Yeole BB. Trends in the brain cancer incidence in India. *Asian Pac J Cancer Prev.* 2008;9:267–70.
14. Vimal S, Dharwadker A, Vishwanathan V, Agarwal N. Histopathological spectrum of central nervous system tumours in a tertiary care centre. Indian J Pathol Res Pract. 2020;9(2):103-10.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 08, 2023

15. Mehta J, Bansal B, Mittal A, Mathur K, Vijay R. Histological analysis of primary brain tumors in a tertiary care hospital: a retrospective study of 5 years. Int J Med Res Prof. 2017;3(5):14-8.
16. Dhar R,Bhemat D.Clinicopathological correlation of CNS tumors .International journal of research and review.2019 :6(3): 181-187
17. Debadrita Sen et al / International Journal of Medical Reviews and case Reports (2022) 6 (3) ; 1-6