

ORIGINAL RESEARCH

To examine the range of histopathological characteristics seen in central nervous system tumors

Dr. Barunesh Kishore

Assistant Professor, Department of Dermatology, Santosh Medical College, Ghaziabad, Uttar Pradesh, India

Corresponding Author

Dr. Barunesh Kishore

Assistant Professor, Department of Dermatology, Santosh Medical College, Ghaziabad, Uttar Pradesh, India

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ABSTRACT

Aim: To examine the range of histopathological characteristics seen in central nervous system tumors. **Materials and Methods:** The present retrospective study is conducted in department of pathology. In the present study a total of 50 cases of CNS tumors were diagnosed and categorized according to the WHO 2016 classification while immunohistochemistry done wherever required. CNS tumors of all age groups were included while cases with incomplete data were excluded from study. According to the WHO 2016 classification of CNS tumors molecular parameters were included along with histopathological examination. **Results:** In our study CNS tumors were most frequently seen in cerebrum comprising of 31 cases (62%) out of which frontal lobe of cerebrum were the most common site followed by parietal and temporal lobe respectively. All CNS tumors were histopathologically categorized according to the WHO 2016 classification system and were graded from I-IV. In our study out of total 50 CNS tumors, WHO grade I tumor was considerably higher comprising 26 cases (52%), WHO grade II tumor was 11 cases (22%), WHO grade III tumor was 5 cases (10%) and WHO grade IV tumor was 8 cases (16%). Most common histopathological subtype was Meningioma (25) followed by Astrocytic(12), Oligo dendroglial(4), Ependymal(4), with one case each of Astroblastoma, Ganglioglioma, Hemangioblastoma and Atypical choroid plexus papilloma. Overall tumor of meninges (50%) was the most common with female predominance. The median age of meningioma was 43.35±5.36 years. The most common histological subtype was transitional meningioma followed by fibroblastic and meningiothelial meningioma with one case of Anaplastic meningioma. **Conclusion:** The present study reflects the histopathological spectrum and incidence of various types of CNS tumors in both adults as well as pediatric age groups. Rising global trends in the incidence of CNS tumors have been observed despite of age. Irrespective of advanced imaging techniques, the histopathological examination continue to exist as gold standard in their diagnosis and classifying CNS tumors.

Keywords: CNS, Tumors, Grade

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INTRODUCTION

Tumor of the central nervous system are rare and constitute about 1-2% of all malignancies with high morbidity and mortality[1]. In India CNS tumors are reported to be 1.9% of all tumors[2]. The worldwide incidence rate of CNS tumors are higher in developed countries than in developing countries. As in developing countries like India, due to limited health services, low health budget and lack of registration of newly diagnosed cases, the exact burden of CNS tumors get unnoticed. But now days the incidence of CNS tumors seems to be increasing in developing countries due to increased availability of diagnostic modalities. Tumors of CNS show bimodal age distribution with one peak in children while another peak in 45-70 years of age[3]. All tumors of central nervous system were histological graded according to

the WHO 2016 classification which predicts the biological behaviour of neoplasm. According to WHO 2016 classification all CNS tumors are classified as grade I –IV which determine the choice of therapies as well as prognosis of patient [4]. The predominant CNS tumors are meningioma and glioma, and the most common WHO grade IV tumors are glioblastoma NOS. Histopathological examination of CNS tumors played major role in differential diagnosis and improved diagnostic accuracy by using conventional H and E slides and immunohistochemistry wherever required. In our study histological grading of brain tumors, age groups, site and gender distribution were systematically recorded.

MATERIALS AND METHODS

The present retrospective study is conducted in department of pathology. Ethical clearance was obtained from institute. In the present study a total of 50 cases of CNS tumors were diagnosed and categorized according to the WHO 2016 classification while immunohistochemistry done wherever required. CNS tumors of all age groups were included while cases with incomplete data were excluded from study. According to the WHO 2016 classification of CNS tumors molecular parameters were included along

with histopathological examination. But due to unavailability of molecular testing and cytogenetic studies the diagnosis was reclassified as tumor NOS.

RESULTS

The present study was conducted on 50 cases of CNS tumors in the department of pathology. In our study the CNS tumors showed a slight male predominance with mean age of 39.93 ± 5.63 . Most predominant age group affected was between 30-50 years.(Table 1)

Table1: Age distribution of CNS tumors

Age Group	No Of Cases	Percentage
Below 20	3	6
20-30	8	16
30-40	15	30
40-50	12	24
50-60	7	14
Above 60	5	10

In our study CNS tumors were most frequently seen in cerebrum comprising of 31 cases (62%) out of which frontal lobe of cerebrum were the most common site followed by parietal and temporal lobe respectively. All CNS tumors were histopathologically categorized according to the WHO 2016 classification system and

were graded from I-IV. In our study out of total 50 CNS tumors, WHO grade I tumor was considerably higher comprising 26 cases (52%), WHO grade II tumor was 11 cases (22%), WHO grade III tumor was 5 cases (10%) and WHO grade IV tumor was 8 cases (16%).

Table 2 Grade of the tumor

	Number	Percentage
Grade I	26	52
Grade II	11	22
Grade III	5	10
Grade IV	8	16

Most common histopathological subtype was Meningioma (25) followed by Astrocytic(12), Oligodendroglial(4), Ependymal(4), with one case each of Astroblastoma, Ganglioglioma, Hemangioblastoma and Atypical choroid plexus papilloma.(Table 3)

Table 3: CNS tumors based on histopathological Type

Histopathological Type	No of Cases	Percentage
Meningioma	25	50
Astrocytic Tumor	12	24
Oligodendroglial Tumor	4	8
Ependymal Tumor	4	8
Astroblastoma	1	2
Ganglioglioma	1	2
Craniopharyngioma	1	2
Hemangioblastoma	1	2
Atypicalchoroid plexus papilloma	1	2

Overall tumor of meninges (50%) was the most common with female predominance. The median age of meningioma was 43.35 ± 5.36 years. The most common histological subtype was transitional meningioma followed by fibroblastic and meningiothelial meningioma with one case of Anaplastic meningioma. There were 21 cases (84%) of grade I meningioma, 4 cases (16%) of grade II (Table 4).

Table 4: Tumors Of Meninges based on histopathological entities and WHO Grade

Histopathological Type Of Meningioma	No Of Cases=25	Grade
Transitional	8	I
Meningiothelial	5	I
Fibrous	5	I
Atypical	4	II
Secretory	1	I
Psammomatous	1	I
Anaplastic	1	I

In our study the second most common tumor was astrocytic and oligodendroglial tumors (32%). Male predominance was seen with mean age was found to be 44.34±5.63yrs. Among the astrocytic tumors, the most common tumor was Glioblastoma NOS (50) followed by oligodendroglial tumors which involves oligodendroglioma NOS (15%), anaplastic oligodendroglioma NOS (10%).

The third most common histological diagnosis was ependymal tumors (8%) with male predominance. Median age group affected was 42.24±4.34 yrs. Out of ependymal tumors WHO grade II ependymal tumors were most common. Among the paediatric CNS tumors (8%) astrocytic tumors (32%) were the most common histological diagnosis.

DISCUSSION

The present study comprised of 50 CNS tumors and were categorized according to the recent WHO 2016 classification. It has been observed that incidence of CNS tumors is on rise due to improvement in the diagnostic modalities. In our study male predominance was seen which shows concordance with the findings of Nibhoria S et al[5] and Hamdani S M et al respectively[6]. The predominant age group affected was between 30-50 years which was comparable with Jazayeri SB et al[7] in which highest number of patients was seen in the age group of 30-60 years. In our study frontal lobe was the most common site of involvement which was comparable with Trabelsi S et al[8], Zahir ST et al[9], Torres et al[10] and Krishnatreya M et al[11] in which frontal lobe was the most common site of brain tumors. The most common CNS tumor was meningioma (50%) in our population. Ghanghoria S et al[12], Chen L et al[13] and Jaiswal J et al[14] had similar findings in their study comprising of 41.54%, 33.6% and 23.2% of meningioma respectively. Jazayeri SB et al[7] in Iran and Lee CH et al[15] in Korea also showed that the most common tumor was meningioma (27.8% and 31.2% respectively). However, Aryal G[16] observed that most common type of CNS tumor was astrocytoma followed by meningioma. Similarly, Patty IS[17] reported that astrocytoma was the most common tumor which is contrasting to our study. In our study meningioma showed female predominance which was similar to the findings of Kakshapati T[18] and Nibhoria S et al[5].

As mentioned earlier, the most common histological subtype was transitional meningioma followed by

fibroblastic type while Thambi R et al[20] observed that transitional meningioma followed by meningiothelial type. In our study WHO grade I meningioma was the most common which was comparable with Thambi R et al[20]. The second most common tumor was astrocytoma having male predominance which was comparable with findings of Jaiswal J et al[14], Jazayeri SB et al[7] and Ghanghoria S et al[12]. Among astrocytoma, WHO grade IV Glioblastoma NOS was predominant which occur at the median age of 52.5 years. The study conducted by Jaiswal J et al[14], Thambi R et al[20] also reported similar findings. In the present study the most common CNS tumor in children was astrocytic tumors comprising of 32% which showed concordance with Jain et al[21] (34.7%) but slightly higher than findings of Nibhoria S et al[5] and Lee CH et al[15] (29.2% and 25% respectively). In our study the incidence of various CNS tumors and their distribution was similar to those observed worldwide.

CONCLUSION

The present study reflects the histopathological spectrum and incidence of various types of CNS tumors in both adults as well as pediatric age groups. Rising global trends in the incidence of CNS tumors have been observed despite of age. Irrespective of advanced imaging techniques, the histopathological examination continue to exist as gold standard in their diagnosis and classifying CNS tumors.

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