

ORIGINAL ARTICLE

FREQUENCY AND MORPHOLOGICAL PATTERNS OF CNS TUMOURS
IN A TERTIARY CARE HOSPITAL OF SOUTH PUNJAB

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Background: The incidence of CNS tumours is increasing rapidly especially in young population. CNS tumours include a set of neoplasms which originate from brain parenchyma, pituitary gland, pineal gland, spinal cord and meninges. The aim of this study was to observe the frequency and morphological patterns of CNS tumours in a tertiary care hospital of South Punjab. **Methods:** A cross-sectional descriptive study of 100 cases of brain tumours was conducted at the Pathology Department of DG Khan Medical College, Dera Ghazi Khan. One-hundred cases of CNS tumour biopsies were included with the relevant clinical and radiological findings. **Results:** A total of 100 cases of CNS tumours were studied. The morphological distribution of various CNS tumours was as follows: Astrocytoma (49%), Meningioma (19%), Schwannoma (8%), Oligodendroglioma (6%), Metastatic tumour (4%), Ependymoma (4%), Pituitary Adenoma (2%), Medulloblastoma (2%), Mixed Gliomas (2%), Germ Cell Tumours (1%), Craniopharyngioma (1%), Lymphoma (1%), Vascular tumours (1%). **Conclusion:** Among the CNS tumours Astrocytomas were the commonest tumours followed by Meningiomas, Schwannoma and Oligodendroglioma.

Keywords: Space occupying lesions, Astrocytoma, Glioblastoma, Oligodendroglioma, Medulloblastoma, Brain tumours, Histopathology

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INTRODUCTION

The annual incidence of tumours of CNS ranges from 10 to 17/100,000 persons for intracranial tumours and 1–2/100,000 persons for intraspinal tumours.¹ The incidence of CNS tumours in northern Pakistan is 2.03% and male to female ratio is 2.3:1.² CNS Tumours account for 85% of the brain tumours and 15% of the spinal cord tumours. Metastatic tumours are usually extradural. These tumours account for 2% all the cancer deaths.^{3–5} About 70% of intracranial tumours are supratentorial in adults, the most common being Astrocytoma followed by Meningioma.⁵ Tumours of CNS account the 20% of all the cancers of childhood. Malignant CNS tumours are second commonest cause of death from cancer in the children under 15 years of age exceeded in frequency only by leukemia.^{6,7} In adults, 70% tumours arise in cerebral hemisphere while in children the majority of the CNS neoplasms arise in the posterior cranial fossa.⁸

There are many varieties of brain tumours. Clinical and radiological correlation helps to narrow down the differential diagnosis but the histological diagnosis remains the gold standard.⁹ Astrocytoma are the most common brain tumours. Glioblastoma Multiform is the most frequent in adults while Pilocytic Astrocytoma is the commonest in children under 15 years of age. A four-tier grading system for astrocytoma has been devised by WHO and utilized for other tumours as well.¹⁰ Many reports suggest that both incidence and pattern of intracranial neoplasm are

subject to considerable geographic and racial variations. The exact frequency of various CNS tumours is not known in DG Khan, South Punjab, Pakistan. The aim of the study was to provide comprehensive data about the frequency of CNS tumours in a tertiary care hospital of South Punjab.

MATERIAL AND METHODS

This cross-sectional descriptive study was conducted in the Department of Pathology at DG Khan Medical College, Dera Ghazi Khan, from 1st Jan 2019 to 1st Dec 2021. A total of one-hundred biopsies with the relevant clinical and radiological findings were included in this study. All sufficient CNS biopsies of any age were included in the study. The exclusion criteria were cases with incomplete clinical history, radiological findings, patients on chemotherapy, radiotherapy, non-neoplastic conditions, insufficient and autolyzed biopsies.

The biopsy specimens were fixed in 10% buffered formalin. After overnight fixation, the sections were processed as per routine histological processing. The tissues were dehydrated with ascending grades of alcohol, cleared with xylene, and embedded in paraffin to prepare blocks. These blocks of tissues were cut using a rotary microtome into sections of 3–5 micrometre thickness. The sections were stained with haematoxylin and eosin following the method of Harris haematoxylin^{11,12} Special and immunohistochemically staining was done whenever required.

The histopathological typing and grading with WHO classification was done according to WHO criteria. The result were analysed and relative frequencies of histopathological patterns of various CNS tumours were determined.

RESULTS

A total of 100 cases of CNS tumours were included in this study. The age range of the patients was 5–70 years, with a mean age of 36±14.5 years. Out of 100 cases, 62 were male and 38 cases were female.

Out of 100 cases, 9 were below the age of 20 years while maximum number of cases (23) were found in the 4th decade followed by 5th (19 cases) and 6th (19 cases) decade. (Table-1).

The morphological distribution of CNS tumours was: Astrocytoma (49%), Meningioma (19%), Schwannoma (8%), Oligodendroglioma (6%), Metastatic Tumours (4%), Ependymoma (4%), Pituitary Adenoma (2%), Medulloblastoma (2%), Mixed Glioma (2%), Germ Cell Tumour (1%), Craniopharyngioma (1%), Lymphoma (1%), and Vascular Tumour (1%) (Table-2).

Astrocytoma was the most common tumour (49%) followed by Meningioma (19%). Schwannomas and Oligodendroglioma ranked 3rd and 4th in frequency. Among the 49 cases of Astrocytoma, 3 cases (6.1%) were of Pilocytic Astrocytoma (WHO Grade-I), 18 cases (36.73%) were of Diffuse Astrocytoma (WHO Grade-II), 9 cases (18.36%) were of Anaplastic Astrocytoma (WHO grade-III) and 19 cases (38.77%) were of Glioblastoma Multiforme (WHO Grade-IV). These observations are shown in Table-3.

Table-1: Prevalence of CNS tumour in age groups

Age Group (Years)	Number of Cases
0–9	2
10–19	7
20–29	18
30–39	23
40–49	19
50–59	19
60–69	12

Table-2: Frequency and morphological distribution of 100 cases of CNS tumours

Morphological Types	Percentage
Astrocytoma	49%
Meningioma	19%
Schwannoma	8%
Oligodendroglioma	6%
Metastatic tumours	4%
Ependymoma	4%
Pituitary adenoma	2%
Medulloblastoma	2%
Mixed glioma	2%
Germ cell tumour	1%
Craniopharyngioma	1%
Lymphoma	1%
Vascular tumour	1%

Table-3: Frequency and percentage of astrocytoma (n=49)

Tumour Grade	Frequency	Percentage
Grade-I	3	6.19
Grade-II	18	36.73
Grade-III	9	18.36
Grade-IV	19	38.77

DISCUSSION

CNS tumours are graded I–IV according to WHO classification. Classification and grading assist in proper diagnosis and management of the patients with various treatment methods. Despite some limitations of our study, analysis of CNS tumours shows many features similar to the other published studies.

In this study both age and sex distribution lie within the estimated ranges as in other^{4,5,13,14} reports. However, Aryal *et al*¹⁵ showed equal male to female ratio. The mean age of patients in our study was around 36 years, ranging from 5 to 70 years, which is similar to the study of Adnan *et al*¹⁶, and Nibhoira *et al*¹⁷. This study differs from the study of Masoodi *et al*¹⁸ in which the mean age was 43.3 years.

In our study the greatest number of cases (23) were found in 4th decade followed by 5th (19 cases) and 6th (19 cases) decade. This study is similar to the study of Dogar *et al*¹⁴, Chen *et al*¹⁹, and Vimal *et al*²⁰. Our study differs from the study of Butt *et al*²¹, in which maximum number of cases were found in 3rd decade.

Astrocytoma was the commonest tumour (49%) in our study, followed by meningioma (19%). Similar result was observed by Sajjad *et al*⁵ and Kasa Lakshmi *et al*²². Chen *et al*¹⁹ also observed that Astrocytoma was the commonest tumour (38%) followed by meningioma. On the contrary, Vimal *et al*²⁰ and Ghanghoria *et al*²³, showed that Meningioma was the most common tumour (23.33% and 24.61% respectively) in their studies.

The frequency of meningioma in our study was 19% which is similar to the study of Jaffar *et al*²⁴, in which the incidence of meningioma was 18.8%. The incidence of meningioma reported by Ali *et al*²⁵ is 15–20%. Schwannoma constituted 8% cases in our study. This is almost same as reported by Awan *et al*²⁶. In a study done by Pidakala *et al*²⁷, Schwannoma constituted the second most common tumour after the Astrocytoma.

In this study amongst the 49 cases of Astrocytoma, 3 cases (6.1%) were of grade-I, 18 Cases (36.73%) were of grade-II, 9 cases (18.6%) were of grade-III, and 19 cases (38.77%) were of grade-IV Astrocytoma. These observations are similar to the study of Sajjad *et al*⁵.

CONCLUSION

Astrocytoma is the most common tumour followed by meningioma in our region. Among the Astrocytoma,

Glioblastoma multiforme (WHO grade-IV) is the most common tumour in adults while Pilocytic Astrocytoma is the commonest tumour in children. Schwannoma and Oligodendroglioma ranked 3rd and 4th common tumours in this study. Further work is required about CNS tumours to see the local aetiological factors, racial, and genetic factors for early diagnosis and better prognosis, and proper management of patients.

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