ORIGINAL ARTICLE

MORPHOLOGICAL ANALYSIS OF ASTROCYTOMA

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Background: Astrocytoma is the most common brain tumour in adults. It is the second common tumour of CNS in children. The purpose of this study was to provide preliminary data on morphological patterns of astrocytoma in Pakistan. **Methods:** This was a descriptive cross-sectional study on diagnosed cases of astrocytoma admitted in Neurosurgery Ward, Lahore General Hospital, Pakistan. Biopsies were examined histologically using paraffin sections. Histopathological grading of astrocytoma was done according to WHO classification. **Results:** Out of total 40 cases, Glioblastoma multiforme (GBM) was the most common tumour accounting for 16 (40%) cases. Diffuse astrocytoma was the second common tumour seen in 13 (32.5%) cases, 9 (22.5%) were anaplastic astrocytoma, and 2 (5%) cases were diagnosed as pilocytic astrocytoma. Males were slightly more affected than females with a ratio of 1.6:1. Maximum number of cases (25%) were found in the 3rd decade and then in 5th, 6th and 7th decade (17.5%) each. Least number (2.5%) of cases were found in 1st decade of life. **Conclusion:** Glioblastoma multiforme is the most common astrocytic brain tumour in adults, and pilocytic astrocytoma is the least common brain tumour.

Keywords: Pilocytic astrocytoma, diffuse astrocytoma, anaplastic astrocytoma, glioblastoma multiforme, GBM

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INTRODUCTION

The annual incidence of CNS tumours ranges from 10 to 17 per 100,000 persons for intracranial tumours, and 1 to 2 per 100,000 persons for intraspinal tumours.[1] Incidence of brain tumours is associated with age, and highest frequency is seen in older people. The 2nd common cancer in childhood is brain tumour after leukaemia. CNS tumours account for more than 20% of all tumours diagnosed in children.[2] In the United States, brain cancer is the 2nd common cause of death among children aged 1–14 year after acute lymphoblastic leukaemia.[3] In Pakistan, CNS tumours account for less than 2% of all primary tumours. CNS tumours often cause psychological trauma, mental debilitation and neurological deficits. It is important to understand the epidemiology of CNS tumours for prevention, early detection and treatment of CNS tumours. Several countries have well established and maintained CNS tumour registries.[4]

The incidence of brain tumours in children in northern Pakistan is about 15%.[5] Neuroepithelial tumours form the majority of CNS lesions.[6] Gliomas constitute approximately 50% of the all brain tumours.[7]

Astrocytomas are the most common type of gliomas[8] and account for 80% of all primary brain tumours occurring in 4th to 6th decade of life. They are usually located in the cerebral hemispheres, followed by cerebellum, brain stem, and spinal cord.[1] Frontal lobe is the frequently affected site in adults.[3] In children, cerebral astrocytoma ranks second only to meduloblastoma in frequency of occurrence.[9–11]

The aim of this study was to provide preliminary data on the morphological pattern of astrocytoma, which is the most common brain tumour in the Central Punjab, Pakistan.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted at the Department of Pathology, Postgraduate Medical Institute Lahore, from March 2016 to July 2017. Samples were received from Neurosurgery Wards of Lahore General Hospital, Lahore. All forty cases of astrocytomas received during study period were included in this study. Histological classification of these tumours was performed according to WHO classification.

Samples were collected in 10% buffered formalin as fixative.[12,13] Gross examination of the biopsies was performed. Tissue sections were stained with haematoxylin and eosin following the method of Haris hematoxylin.[14,15] Tissue sections were examined and diagnosis was done on histological assessment only. No immunohistochemistry was performed. Data was analysed using SPSS-17.

RESULTS

Out of 40 cases, 16 (40%) cases were diagnosed as glioblastoma multiforme (WHO grade IV), 13 (32.5%) as diffuse astrocytoma (WHO grade II), 9 (22.5%) as anaplastic astrocytoma (WHO grade III), 2 (5%) were diagnosed as pilocytic astrocytoma (WHO grade I). Twenty-six specimens were from male patients and 14 were from female patients. Male to female ratio was 1.8:1 (Table-1).

Three cases were below 20 years of age. Maximum number of cases were found in age group 20 to 29 years, i.e., in the 3rd decade. From the 4th to 7th decade of age the number of cases remained between 6 to 7 (Table-2).

Frontal region (9, 22.5%), temporoparietal region (9, 22.5%) and temporal region (8, 20%) were the common sites of tumours. Frontoparietal region, parietal region and thalamic region were the next commonly affected sites with a number of cases 4, 4, and 3 respectively. Posterior cranial fossa, cerebellum and parieto-occipital region were the least commonly affected sites with one cases in each region (Table-3).

Table-1: Frequency of different types of astrocytoma in relation to gender

Types of Astrocytoma	Gender		M:F	Total	Percentage
	M	F	Ratio		
Glioblastoma multiforme	10	6	1.6:1	16	40.0
Diffuse Astrocytoma	10	3	3.3:1	13	32.5
Anaplastic Astrocytoma	5	4	1.2:1	9	22.5
Pilocytic Astrocytoma	1	1	1:1	2	5.0

Table-2: Age distribution in cases of astrocytoma

Age Group (Years)	Number	Percentage
0–9	1	2.5
10–19	2	5.0
20–29	10	25.0
30–39	6	15.0
40–49	7	17.5
50–59	7	17.5
60–69	7	17.5

Table-3: Sites of tumour in astrocytoma cases

Site of Biopsy	Number	Percentage
Frontal region	9	22.5
Temporoparietal region	9	22.5
Temporal region	8	20.0
Frontoparietal region	4	10.0
Parietal region	4	10.0
Thalamic region	3	7.5
Posterior cranial fossa	1	2.5
Cerebellum	1	2.5
Parietoccipital	1	2.5

DISCUSSION

This study shares several findings common with other published studies. Both age and sex distribution lies within the estimated ranges of other reports. The male to female ratio of 1.8:1 in this study corresponds to other studies who have reported an overall male to female ratio of 1.6:1 and 1.17:1 respectively.[6,16]

In this study maximum number of cases were found in the 3rd age decade (25%), then in 5th to 7th decade (17.5% each) and then in the 4th decade (15%). This finding is similar to a local study in which brain neoplasms mostly occurred in 3rd and 6th decade.[5]

In comparison to some other studies from Asian countries, brain tumours occurred mostly during the 4th decade of life[17,18] and in the western countries during the 5th and 6th decades of life.[19,20] This could be due to different age characteristics of the population as well as different case ascertainment in the two country groups, with a higher rate of autopsies in the latter.

The incidence of Glioblastoma multiforme was 40% in this study as compared to a study from a western country in which the incidence of GBM was 60 to 70%.[21] This contradiction may be due to high rate of autopsies in western countries and limited number of cases in this study.

A study from Aga Khan University Hospital Karachi[5] reported that grade III and grade IV astrocytomas account for 60.4% of astrocytoma and it is in agreement with the present study. According to our study frontal region (22.5%), temporoparietal region (22.5%) and temporal region (20%) were the most common sites affected by these tumours. In this aspect, this study is similar to other studies in which frontal lobe are the commonest site.[5]

CONCLUSION

Among the astrocytomas, glioblastoma multiforme is the most common brain tumour. Pilocytic astrocytoma is the least common tumour. Astrocytic tumours are slightly more common in males as compared to females. Frontal and temporoparietal regions are the most common sites of these tumours.

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