

Statistical Analysis of Astrocytic Glioma

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Fifty patients of both sexes of Astrocytic Glioma from Sheikh Zayed Hospital and Lahore General Hospital Lahore were included in this study. Ten normal brain tissues (control) were taken from accident cases. Out of 50 study cases there were 16 (32%) were low grade (I-II) Astrocytic Glioma and 34 (68%) were high grade Astrocytic Glioma. The male to female percentage was found out to be 26 (52%) and 24 (48%) respectively. Among the males, 11 (22%) were in grade I-II while 15 (30 %) were in grade III-IV Astrocytic Glioma, while 5 (10 %) females were in grade I-II and 19 (38 %) were in grade III-IV. No statistical sex difference was seen in the ratio of male and female who developed Astrocytic Glioma ($P>0.05$). The ages of the patients ranged from 10 to 76 years with maximum number of cases in the age group 30-49 years. In this age group, 11 (22%) patients had grade I-II while 20 (40%) were in grade III-IV type of Astrocytic Glioma. The statistical difference of age in different groups was found to be highly significant, ($P<0.01$). The most common presenting complaints were headache, vomiting, weakness of limbs, loss of orientation and giddiness. These were observed mainly in grade III-IV Astrocytic tumors. The complaints of difficulty in speech, papilloedema and fits were observed often with an almost equal ratio in all grades of Astrocytic Glioma. The loss of consciousness was observed only in Grade III-IV tumors. The most common site of Astrocytic Glioma was Parietal lobe and Fronto-parietal lobe constituting 9 (18%) in grade I-II and 15 (30%) in grade III-IV Astrocytic Gliomas, that is statistically significant, ($P<0.05$). The most common site of Astrocytic Glioma was Parietal lobe, 17 out of 50 (7 in grade I-II and 10 in grade III-IV), while the second most common site of this tumor was Temporo-parietal region, (4 in grade I-II and 6 in grade III-IV). There were 29 Astrocytic Gliomas in right lobe (10 in grade I-II, and 19 in grade III-IV), while 18 in left lobe (5 in grade I-II and 13 in grade III-IV). This was statistically highly significant, ($P<0.01$). High grade Astrocytic Glioma was also present in Thalamus, mid brain, and Interventricular septum.

Key words: Astrocytic, glioma, analysis

Intracranial tumor is an annoying disease because the brain tumors are second most leading cause of death from neurological diseases¹⁻². However, they are rare tumors, representing only 1.5% of all cancers reported in the United States.³ (Neuro-Oncology Program 2005) Among intracranial tumors, the incidence of primary tumors of central nervous system (CNS) ranges from 10-17 per 100,000 persons and in America⁴. These are one of the most common neoplasm in children and adults and unusual over age of 70 years^{4, 5-6}

Tumors, which start in the brain, are called primary brain tumors and are classified according to the kind of cell from which the tumor seems to originate. The most common primary brain tumor in adults comes from cells in the brain called astrocytes that make up the blood-brain barrier and contribute to the nutrition of the central nervous system. These tumors are called Gliomas (astrocytoma, anaplastic astrocytoma, or Glioblastoma multiform and Ependymomas, Gangliogliomas, Oligodendrogliomas) and account for 65% of all primary central nervous system tumors^{5, 7-9}

According to Khalil et al² (2001) the neuroepithelial tumors in Pakistan are 48% of all intracranial tumors with a relative frequency of astrocytoma in adults being 10% (grade I-II), 14.64% (grade III) and 13.21% (grade IV) respectively.

In children brain tumors account for 20% of all childhood malignancies⁴. While astrocytoma account for 2.6 % of the primary brain tumors in children less than 15 years of age¹⁰. According to Ghazala and Shahzad¹¹ (2004) the incidence of brain tumor in children in Pakistan is 75.8% and among all the glial tumours Astrocytomas are the commonest comprising 44.8% of all intracranial neoplasms.

The Astrocytomas are the neuroectodermal tumors, and most of them are supratentorial in location⁹. Astrocytomas are infiltrating tumors and arise from fibrillary or fibrous astrocytes¹². Astrocytomas constitute majority of all primary brain tumors and are the most common intracranial neoplasm¹³⁻¹⁵. They occur throughout the brain, but majority of them involve cerebral hemisphere^{4, 16}. Astrocytoma occurs at all ages but is most common in adults¹⁷⁻¹⁸. However low grade Astrocytomas commonly affect young adults and often these tumors progress to higher-grade astrocytoma¹⁹.

Astrocytoma is the most common type of glioma and develops from a type of star-shaped cell called an astrocyte. Astrocytomas can occur in most parts of the brain and occasionally in the spinal cord. However, they are most commonly found in the main part of the brain, the cerebrum (the white area on the diagram), particularly the frontal and temporal lobes²⁰

Astrocytomas are neoplasms composed of astrocytes showing various degrees of maturity. They differ a great deal in their gross features, microscopic appearances, and biologic behavior. The morphologic variation is not surprising if we recall the different structural forms, which may be adopted by the normal and reactive

Patients and Methods

Fifty patients of Astrocytic Glioma from Sheikh Zayed Hospital and Lahore General Hospital Lahore were included in this study. Adult patients of both sexes were taken into consideration. History of the patients along with relevant investigations was recorded. Particular stress was given on the Age, Sex and Clinical findings of the patient. The C.T Scan report was also added to the history of the patient. The specimens were collected in properly labeled jars, containing 10% formal saline. Detailed gross examination of each specimen was carried out and recorded. Representative tissue sections were taken.. The tissues were processed in an automatic processor. Embedding of tissues was done in paraffin wax using L-shaped metal moulds. Each block was cut into multiple sections 3-4 micrometer thick on a rotary microtome. Sections were taken on albumenized slides. The sections of all the cases were stained with Haematoxylin and Eosin.

Results and Observations:

Ten normal brain tissues (control) were taken from accident cases and fifty of Astrocytic Glioma was evaluated for Argyrophilic staining of Nucleolar Organizer Regions. A detailed history of each case was recorded; describing age, sex, clinical complaints and site of brain biopsy and computerized tomography (CT) finding. Computerized Tomography (CT-scan) was performed on all patients; there was variable picture in all grades of Astrocytic Glioma in our study.

Out of 50 study cases there were 16 (32%) were low grade (I-III) Astrocytic Glioma and 34(68%) were high grade Astrocytic Glioma. The male to female percentage was found out to be 26(52%) and 24(48%) respectively (Table I,III). Among the males, 11(22%) were in grade I-II

while 15(30 %) were in grade III-IV Astrocytic Glioma, while 5(10 %) females were in grade I-II and 19 (38 %) were in grade III-IV. No statistical sex difference was seen in the ratio of male and female who developed Astrocytic Glioma (P>0.05).

The ages of the patients ranged from 10 to 76 years with maximum number of cases in the age group 30-49 years. In this age group, 11(22%) patients had grade I-II while 20 (40%) were in grade III-IV type of Astrocytic Glioma (Table I,II). The mean age in grade I-II Glioma was calculated to be 40.18±8.16 years, whereas in grade III-IV it was 40.58 ±12.29 years (Table I,II). The statistical difference of age in different groups was found to be highly significant, (P<0.01).

The most common presenting complaints were headache, vomiting, weakness of limbs, loss of orientation and giddiness. These were observed mainly in grade III-IV Astrocytic tumors (Table I, II). The complaints of difficulty in speech, papilloedema and fits were observed often with an almost equal ratio in all grades of Astrocytic Glioma. The loss of consciousness was observed only in Grade III-IV tumors.

The most common site of Astrocytic Glioma was Parietal lobe and Fronto-parietal lobe constituting 9(18%) in grade I-II and 15(30%) in grade III-IV Astrocytic Gliomas, that is statistically significant, (P<0.05). The most common site of Astrocytic Glioma was Parietal lobe, 17 out of 50(7 in grade I-II and 10 in grade III-IV), while the second most common site of this tumor was Temporo-parietal region, (4 in grade I-II and 6 in grade III-IV). These differences were statistically significant as compared to all other sites described in Table II, while non-significant between the two common sites described in our study.

There were 29 Astrocytic Gliomas in right lobe (10 in grade I-II, and 19 in grade III-IV), while 18 in left lobe (5 in grade I-II and 13 in grade III-IV)). This was statistically highly significant, (P<0.01). High grade Astrocytic Glioma was also present in Thalamus, mid brain, and Interventricular septum (Table I,II,III).

Table-I- Distribution of different grades of Astrocytoma according to sex and age

Grade of Astrocytoma	Sex		Total (%)	Age Groups (Years)			Total (%)
	Male (%)	Female (%)		10-29 (%)	30-49 (%)	>50 (%)	
I-II	11(22%)	5(10%)	16(32%)	2	11	3	16(32%)
III-IV	15(30%)	19(38%)	34(68%)	5	20	9	34(68%)
Total	26(52%)	24(48%)	50(100%)	7	31	12	
P value	NS	NS		HSF	HSF	HSF	

NS= Non significant (P>0.05) HSF= Highly significant (P<0.01)

Table II Side of brain biopsy in 50 cases of astrocytic glioma

Lobe	Grade		Total
	I-II	III-IV	
Right Lobe	10 (20%)	19 (38%)	29
Left Lobe	6 (12%)	12 (24%)	18
Thalamus	-	1 (2%)	1
Mid Brain	-	1 (2%)	1
Interventricular	-	1 (2%)	1

P<0.01 (H.S) = Highly significant

Table:-III: - Site of Brain Biopsy in 50 cases of Astrocytoma

Sr. No	Site of Brain Biopsy	Grade Astrocytoma		Total
		I-II	III-IV	
1	Parietal	7(14%)	10(20%)	17
2	Frontal	1(2%)	6(12%)	7
3	Temporal	2(4%)	1(2%)	3
4	Fronto-Parietal	2(4%)	5(10%)	7
5	Temporo-Parietal	4(8%)	6(12%)	10
6	Fronto –Temporal	0	1(2%)	1
7	Interventricular	0	1(2%)	1
8	Parieto-occipital	0	2(4%)	2
9	Thalamic	0	1(2%)	1
10	Midline	0	1(2%)	1
Total		16	34	50

Highly significant between site 1&5 as compared to other sites (P<0.01)

Discussion:

Neuropathology immersed as a distinct discipline during the later half of 19th century. Among the diseases of brain the most challenging group is the brain tumor^{12, 22}.

The central nervous system is among the three leading sites of cancer mortality in the first three decades of life. It has been reported that the incidence of brain tumor has been rising in the recent years, but much of this increase can be attributed to more accurate diagnosis due to presence of new histological techniques and radiological images²³⁻²⁶.

Most of the brain tumors are benign in nature but act as lethal because of its space occupying lesions²⁷⁻²⁹. Gliomas are a class of tumor that develops from glial (neuroepithelial or support) cells. Astrocytes, ependymal, and oligodendroglial cells are all examples of glial cells that compose the supportive tissue of the brain. Gliomas comprise nearly one-half of primary brain tumors and one-fifth of all primary spinal cord tumors⁸.

Tumors originating from astrocytes are called Astrocytomas most of which are supratentorial occurring throughout the brain but primarily affect the cerebral hemispheres^{4, 30-31}.

There are four clinicopathological entities of Astrocytic tumors including Pilocytic astrocytoma, fibrillary astrocytoma, anaplastic astrocytoma and Glioblastoma multiforme^{7, 14}. They are categorized according to their degree of malignancy. One system grades these tumors on the scale of I to IV and WHO system grades on a scale I to III³¹⁻³².

In our study the Astrocytic Glioma was slightly more in males as compared to females (male to female ratio was 1.08:1. This male to female percentage was found out to be 52% and 48% respectively (Table 1). Among the males, 11 (22%) were in grade I-II and 15 (30 %) were in grade III-IV, while 5 (10 %) females were in grade I-II and 19 (38 %) were in grade III-IV (Figure 1). There was no statistical sex difference found in the ratio of male and female who developed Astrocytic Glioma in our study (P>0.05). The results of our study are close to Wen Qing et al (1982)³³, Badhe et al (2004)³⁴ and Stark et al (2005)³⁵ who found male to female ratio 1.5: 1, 1.04: 1 and 1.2:1 respectively.

While our results are not consistent with the study of Khalil et al (2002)² who found male to female ratio 2.77:1.

Astrocytoma is the most common primary malignant brain tumor in adults; responsible for 75% of adult primary malignant brain tumors³⁶ (Huang et al 2004) the incidence of brain tumor varies with age³⁷ (Harsh. IV 1994). Most of the glial tumor show peak incidence in children¹¹ (Ghazala and Shazad 2004) and young adults³⁵. The anaplastic Astrocytoma and Glioblastoma multiforme are more common in older age group (5th and 6th decade)³¹⁻³⁸

In our study the age range of Astrocytic Glioma is 10-50+ years. It is more common in 3rd, to 5th decade of life, 11 (22%) patients were grade I-II while 20 (40%) were in grade III-IV (Table 2). The mean age in grade I-II Glioma is calculated to be 40.18 ± 8.16 years, whereas in grade III-IV it is 40.58 ± 12.29 years (Table 2). The statistical difference of age in different groups was found to be highly significant, (P<0.01). Our study is consistent with others who found that low grade Astrocytoma is more common in younger age group while high-grade tumors are more prevalent in older age group of humans. More over the site, side, presenting complaints and finding of Computerized Tomography (CT) finding are almost same in our study as other have noted³⁹⁻⁴²

In our study Astrocytic Gliomas are more common in supratentorial region, which is consistent to the literature. It has been seen these tumors most frequently effect supratentorial compartment³¹.

In our study right to left ratio of Astrocytic Glioma was 1.61:1. This side difference was statistically highly significant P< 0.01. These results are same as that of others. According to Khalil et al 2002², right side of brain is frequently affected by Astrocytic Gliomas than left side with ratio of 1.44: 1 while it was 1.81: 1. and Frontal region (cerebral Hemisphere) being the most common for Astrocytic Glioma (40%)⁴³ while Khalil 2002² reported Frontal and Parietal lobes as the most common sites. He also quotes temporal, temporo-parietal and occipital lobes as other most common sites respectively. In our study the most common site of Astrocytic Glioma was Parietal lobe, 17 out of 50 (7 in grade I-II and 10 in grade III-IV), while the second most common site of this tumor was temporo-parietal region, (4 in grade I-II and 6 in grade III-

W). These differences were statistically significant as compared to all other sites described in Table 4, while non-significant between the two common sites described in our study.

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