

## Different Histological Subtypes Of Intracranial Astrocytomas And Their Age Incidence

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### Abstract

*This is a prospective study carried out in the Department of Neurosurgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbag, Dhaka. The sample size (n) was 57. Data was collected by the help of a checklist and histopathology report. Collected data was corrected, edited and calculated manually. In our series highest number of cases were of glioblastoma multiformae type (47.4%). Followed by low grade astrocytoma (42.1%) and anaplastic (10.5%) subtype. Mean age of all cases was 38.7 years. Mean age of low grade astrocytomas, anaplastic and glioblastoma multiformae was respectively 31.9, 48.0 and 36.2 years. Regarding sex incidence and mean age, our study showed a fair similarity with the international studies. Aim of our study is to find out the age incidence of different subtype of intracranial astrocytomas as well as to compare our study with international studies.*

*Key words—*anaplastic astrocytoma, glioblastoma multiformae, mean age.

### Introduction

Approximately half of all primary brain tumors are glial cell neoplasms and more than three quarters of all gliomas are astrocytomas. Astrocytomas are histologically heterogenous group of primary brain tumors that are both graded and classified.

Tumor grading is important for prognosis and therapy. Grading of a cerebral neoplasm should be ideally based on the morphological features of malignant cells present. Unfortunately, astrocytomas are often histologically heterogenous, and focal biopsy specimens can be unrepresentative or misleading.

The traditional astrocytoma grading scale is Kernohan grading. It is a four point scale of ascending malignancy from 1 (benign) to 4 (glioblastoma multiforme). This has been modified by the National Brain Tumor Study Group and World Health Organization (WHO) into a three-tiered system for grading for diffusely infiltrating astrocytomas<sup>1</sup>.

Low grade astrocytomas are either focal or well-delineated or diffusely infiltrating. These tumors are in Kernohan grades 1 or 2 and in WHO grade II. Low grade astrocytomas are 10 to 15% of all astrocytomas. Age incidence lies between 20 to 40 years. In images these tumors are diffuse / focal. Hypodense / intense on NECT / T1W1; hyperintense on T2 weighted MRI. Calcification presents in 15 to 20 % cases. No necrosis is present. Edema and hemorrhage are rare. Enhancement is mild / absent and inhomogenous<sup>2</sup>.

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Anaplastic astrocytomas are diffusely infiltrating fibrillary astrocytomas. These tumors are in Kernohan grades 3 and in WHO grade III. Anaplastic astrocytomas are one third of all astrocytomas. Age incidence lies between 40 to 60 years. Ramamurthi found 44% of their intracranial astrocytoma patients at under the age of 30 years<sup>3</sup>. Zulch<sup>4</sup> showed that average age of intracranial astrocytoma was 36.15 years when it was 31.51 years in Dastur's series<sup>5</sup>. According to the study of Mc Karen and Thomas mean age for low grade intracranial astrocytoma was 37.4 years<sup>6</sup>.

In images these tumors are inhomogenous mixed density / intensity. Calcification are uncommon. Edema is common. Hemorrhages are occasionally present. Irregular rim enhancement are common.

Glioblastoma multiforme are poorly delineated partially necrotic astrocytomas. These tumors are in Kernohan grades 4. Glioblastoma multiforme are 50 % of all astrocytomas. Age incidence is above 50 years. In images these tumors are thick irregular 'rind' of tissue around necrotic core. These tumors are highly vascular. Calcification is rare. Edema and hemorrhage are common. Strong inhomogenous enhancement is common.

Different subtypes of astrocytomas shows different age group predominance. Aim of our study is to find out the age incidence of different subtype of intracranial astrocytomas as well as to compare our study with international studies.

#### Materials and methods :

This is a prospective study entitled "different histological subtypes of intracranial astrocytomas and their age incidence." This study was carried out in the Neurosurgery Department of Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka. This study was carried out from January 2003 to December 2004. Nonprobability convenience or purposive sampling was done. All the patients admitted with intracranial astrocytoma in the department of Neurosurgery of

Bangabandhu Sheikh Mujib Medical University, who underwent surgery during the study period (January 2003 to December 2004) were included. The sample size (N) was 57. The data was collected by the help of a checklist and histopathology report. Collected data was corrected, edited and calculated manually.



Fig 1: MRI of brain axial view. T2 weighted film showing intracranium

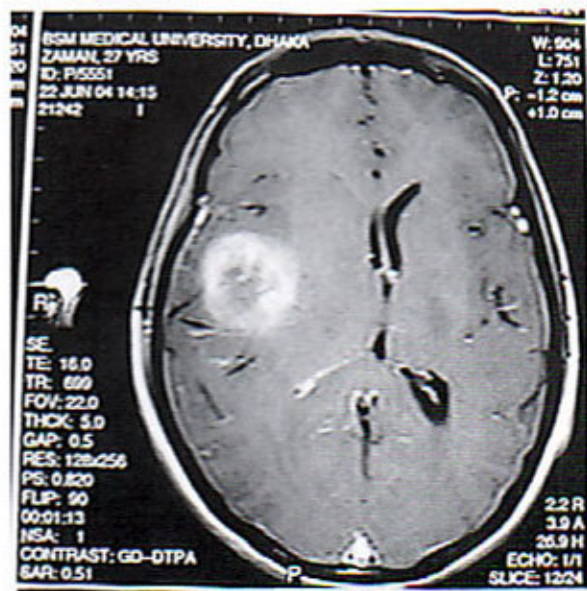


Fig 2: MRI axial view with contrast showing intracranial astrocytoma

**Results**

Our study was done on 57 intracranial astrocytoma patients. All patients underwent craniotomy or Burr Hole biopsy to prove the histopathological diagnosis.

**Table – I**

Distribution according to sex (n = 57)

Sex	no. of cases	percentage
Male	42	73.68%
Female	15	26.32%
Total	57	100 %

Table-I shows the distribution of 57 intracranial astrocytoma patients of our series according to sex. 42 cases (73.68%) were male and 15 cases (26.32%) were female. So, our series shows a male predominance at the ratio of 2.8 : 1.

**Table – II**

Distribution according to histopathological subtype (n = 57)

Histopathological subtype	no. of cases	percentage
Low grade	24	42.1%
Anaplastic	06	10.5%
Glioblastoma multiformae	27	47.4%
Total case	57	100 %

Table – 2 represents the distribution of 57 cases according to histopathological subtype. Low grade astrocytoma were found in 24 cases (42.1%). 06 cases (10.5%) were of anaplastic subtype. But most number of cases were of glioblastoma multiformae subtype. They were 27 in number, 47.4% of all cases.

**Table – III**

Distribution according to age group (n = 57)

Frequency of age(year)	no. of cases	percentage
< 20	15	26.3%
21 – 30	09	15.8%
31 – 40	18	31.6 %
41 – 50	09	15.8 %
> 50	06	10.5 %
Total cases	57	100 %

Table – III shows the distribution of cases according to age frequency. 15 cases (26.3%) were of below 20 years. There were 09 cases (15.8%) who were between 21 to 30 years age group. 18 cases (31.6%) were in between 31 to 40 years. 09 cases (15.8%) were found between 41 to 50 years. Remaining 06 cases (10.5%) were more than 50 years old.

Highest number of cases were between 31 to 40 years age group. Lowest number of cases were in age group above 50 years.

**Table – IV**

Mean age of different subtype groups (n = 57)

Histopathological Subtypes	Mean age (year)	Standard deviation	Mean of all cases(year)
Low grade	31.9	± 4.3	
Anaplastic	48.0	± 4.8	38.7
GBM	36.2	± 5.7	

From Table – IV we get the information that mean age of low grade astrocytoma patients was 31.9 years (SD ± 4.3). Mean age of anaplastic astrocytoma was 48.0 years (SD ± 4.8). Mean age of glioblastoma multiformae (GBM) patients was 36.2 years (SD ± 5.7). But when we calculated the mean age of all 57 patients it was 38.7 years.

## Discussion

Sex incidence of intracranial astrocytomas varies from study to study. Peak age or mean age of different subtypes of intracranial astrocytomas also varies in different series. According to study of Ramamurthi, 73.6 % of their intracranial astrocytoma patients were male<sup>3</sup>. In the study of Chandra male:female ratio was 3 :1<sup>7</sup>. According to the study of Zulch male patients were 55.6%<sup>4</sup>. Mc Keran and Thomas also found a male predominance in their study<sup>6</sup>. In our study we found a male predominance at the ratio of 2.8 : 1. So if we compare our study with other studies we will get a fair similarity with them.

Age incidence of intracranial astrocytomas is a very important variable which also varies from study to study. Ramamurthi<sup>3</sup> found 44% of their intracranial astrocytoma patients at under the age of 30 years. Zulch<sup>4</sup> showed that average age of intracranial astrocytoma was 36.15 years when it was 31.51 years in Dastur's<sup>5</sup> series. According to the study of Mc Karen and Thomas<sup>6</sup> mean age for low grade intracranial astrocytoma was 37.4 years. Mean age for anaplastic subtype of intracranial astrocytomas was 45.8 years and mean age for glioblastoma multiformae was 52 years. Walter and Schmidek<sup>8</sup> presented a more or less similar result in their study. Average age of low grade astrocytoma patient was 30 – 40 years when that of glioblastoma multiformae was 50 – 60 years.

According to Youman's study low grade astrocytomas are non-contrast enhancing area usually present in fourth decades<sup>9</sup>. The anaplastic astrocytomas of the cerebral hemisphere occurs in patients who are generally a decade older than those with a well-differentiated astrocytoma but a decade or

more younger than those with glioblastoma multiformae. The glioblastoma multiformae is the most common of all primary brain tumors. It may occur at any decades of life but most common in fifth decade or above. In our study we found that mean age of low grade astrocytoma was 31.9 years. This was quit similar as other international studies. 48.0 year was the mean age of anaplastic astrocytoma in our study which was also very close to Karen's study (45.8 years) as well as other studies. But in case of glioblastoma mean age of our study was only 36.2 years which was very less in comparison to other international studies. Mean age of all intracranial astrocytoma patients of our series was 38.7 years which was very close to the result of Zulch's (36.15 years) study.

We don't have exactly such type of study in our country to compare with but if we compare our result with international series we can see that sex incidence of our intracranial astrocytoma patients maintain a more or less similar incidence as others have. Highest number of cases were between 31 to 40 years age group. This is also similar to international ones. Our youngest patient was 9 years old and oldest patient was 62 years old showing that no age group is exempted for intracranial astrocytoma. Mean age of glioblastoma patient was found surprisingly low in our study. Probably poor prognosis and rapid deterioration may be one of the important cause of not reaching of such type of patients in hospital in proper time. Headache or seizure is sometimes the early or only symptom for intracranial astrocytoma patients which are ignored by a lot of patients or attendant very frequently. Investigations of intracranial astrocytoma patients ( CT scan , MRI ) are very expensive which are also avoided by

patient party very frequently which is another important cause of not reaching intracranial astrocytomas specially glioblastoma patients in hospital in time.

### Conclusion

Astrocytoma is the commonest primary brain tumor. Males were commonly affected then females. Glioblastoma multiforme was the commonest subtype and it was most malignant also. Low grade astrocytomas were second common followed by anaplastic astrocytoma. Our study showed similarity with other studies regarding sex and percentage of subtypes. But when mean age of subtypes were concern glioblastoma multiforme presents in younger age in our country in comparison to other countries. Average age of low grade astrocytomas and anaplastic astrocytomas were almost as same as in other countries. Late diagnosis, shortage of bed in hospital, delay in operation due to different causes may be considered as limitations of our study. More over number case of our series was not too large to conclude a concrete decision. Further study is needed in different centers of our country to obtain more accurate result.

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