

# HISTOPATHOLOGICAL PATTERN OF INTRACRANIAL TUMORS IN A TERTIARY CARE HOSPITAL OF PESHAWAR, PAKISTAN

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## ABSTRACT

**Background:** Central Nervous System (CNS) tumors include brain and spinal cord tumors, where as metastatic tumors are extradural usually. **Objective:** To know the histopathological pattern of central nervous system tumors reported in Pathology Department Lady Reading Hospital Peshawar, Pakistan. **Methodology:** Study Design: Descriptive case series. Setting: Pathology department, Lady Reading Hospital, Peshawar, Pakistan. Duration: Six years, study from 1<sup>st</sup> January, 2008 to 31<sup>st</sup> December, 2012. Sample Technique: Convenient (non-probability) sampling. Central Nervous System (CNS) biopsy specimen were received in 10% formalin, labeled, gross performed, sections processed in alcohol, xyelen, wax, block prepared, frozen, microtome sections taken and processed for H&E staining, mounted and reported by Histopathologist. The inclusion criteria was any sufficient CNS biopsy specimen of any age, where as the exclusion criteria was insufficient and autolysed biopsy specimen. A minimum of three and maximum of eight 5 micron thick sections were taken from each specimen. Data was entered in SPSS version 15 and analyzed. **Results:** A total of 106 biopsy specimens were received in pathology laboratory with age range of 09 to 70 years, mean age was  $37 \pm 15.18$  years. Male to female ratio was 1.55:1. Astrocytoma was the commonest tumor 49 (48%) cases followed by meningioma 22 (21.%) cases and oligodendroglioma 6 (5.6%) cases. Amongst the 49 cases of Astrocytoma the age range was 10 to 66 years with mean age of  $37 \pm 15.93$ . Male to female ratio was 1.72: 1. Grade I,II,III and IV were 7(14.2%),15(30.3%), 9(19.5%) and were 18 (36.6%) respectively. Amongst the 22 cases of meningiomas age range was 22 to 65 years, 20 (90.9%) cases were grade I meningionas and 2(9.9%) cases were of atypical meningiomas. **Conclusion:** Astrocytoma is the most common tumor of the central nervous system followed by meningioma and oligodendroglioma.

**Key Words:** Astrocytoma, Oligodendroglioma, Medulloblastoma, Histopathology.

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## INTRODUCTION

The brain originates from the midline of embryo as a primitive neural groove which to forms neural tube. This develops focal constriction to form four segments of brain i.e. forebrain, midbrain, hindbrain and spinal cord.<sup>1</sup> Brain tumors are intracranial lesions, which occur in brain parenchyma, also in blood vessels, cranial nerves, meninges, pituitary gland, pineal gland and spinal cord as well.<sup>2</sup> The annual incidence of intracranial tumors ranges from 11-19 per 100,000 persons, amongst these half to three quarters are primary tumors and rest are secondary.<sup>2</sup>

Central Nervous System (CNS) tumors account for 85% of brain tumors and 15 % of spinal cord tumor, however metastatic tumors are usually extradural. These tumors account for about 2% of all cancers deaths.<sup>2,3</sup> Most of these are idiopathic but some have familial association with other syndromes like von Recklinghausen's.<sup>4</sup> About 70% of the intracranial tumors are supratentorial in adults, the most common being astrocytomas followed by meningiomas and metastatic tumors,

where as 70% of the tumors in children are infratentorial, most common of which are astrocytomas followed by medulloblastoma, ependymoma and craniopharyngiomas.<sup>5</sup>

Central Nervous system (CNS) tumors have no detectable premalignant or insitu stage like carcinomas, and also they have poor prognosis and even their benign counterpart may be lethal due to of compression or herniation, They rarely metastasize outside the brain, however metastatic tumors to brain comprises significant proportion 20% of all the CNS tumors, the most common primary are from lungs, breasts, kidneys, melanomas and choriocarcinomas.<sup>6</sup> Computed tomography (CT) scans and especially magnetic resonance imaging (MRI) play a central role in diagnosis of brain tumors.<sup>7</sup>

In the past few decades, the literature review show that the incidence and pattern of CNS tumors are subject to considerable geographic and racial variations. Knowledge of the regional distribution and pattern may can help in the identifications of possible risk factors as well as possible measures for

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improved diagnosis, treatment and prognosis.<sup>7-13</sup> No specific tumor registry regarding the morphological pattern of CNS tumors is available in our area, so it is needed to have a study of this nature in this area of Pakistan.<sup>10</sup> The objective of this study was to know the histopathological pattern of brain tumors in this region.

## METHODOLOGY

This descriptive study was conducted in Pathology Department Lady Reading Hospital, Peshawar Khyber Pakhtunkhawa, Pakistan. The duration of this study was six years, 1<sup>st</sup> January, 2008 to 31<sup>st</sup> December, 2012. Specimen Selection: All the central nervous system biopsies specimen from different hospitals of the province mainly Lady Reading Hospital were collected. A total of 106 cases were included.

Inclusion criteria was all brain biopsies including spinal cord and meninges of any size, age, sex and location which were subjected to histopathology diagnosis.

Exclusion Criteria was insufficient and autolysed biopsy specimen. All the specimens were received in 10% buffered formalin, labeled, representative sections taken and processed in ethanol, xylene and paraffin wax, block prepared, frozen, microtome sections 5 micron thick taken, slides prepared, stained with hematoxylin and eosin, mounted with DPX, labeled and reported by histopathologist. The data was entered in SPSS version 15 and analyzed.

## RESULTS

In this descriptive study, total cases were 106, the age range was from 09 to 70 years with mean age  $37 \pm 15.18$  years. Male to female ratio was 1.55:1. Astrocytoma was the commonest tumor 49 (46%) cases followed by meningioma 22 (20%) cases and oligodendroglioma 6 (5%) cases.(Table-I). Amongst the 49 cases of Astrocytoma the age range was 10 to 66 years with mean age of  $37 \pm 15.93$ . Male to female ratio was 1.72: 1. Grade I Astrocytoma were 7 (14%), Grade II Astrocytomas were 15 (30%), Grade III Astrocytomas were 9 (19%) and Grade IV Astrocytomas were 18(36.6%).(Table II). Amongst the 22 cases of meningiomas age range was 22 to 65 years. Amongst these 20 (90.9%) cases were grade I meningiomas and 2(9.9%) cases were of atypical meningiomas.

**Table I: Morphological pattern of intracranial tumors (n=106)**

Type of tumor	Frequency	Percentage
Astrocytoma	49	46.22%
Meningioma	22	20.75%
Oligodendroglioma	6	5.66%
Medulloblastoma	6	5.66%
Mixed oligoastrocytoma	5	4.71%
Pituitary adnoma	5	4.71%
Ependymoma	5	4.71%
Germ cel tumor	2	1.88%
Hemangioblastoma	2	1.88%
Craniopharyngioma	2	1.88%
Chordoma	1	0.94%
Central neurocytoma	1	0.94%
Total	106	100%

**Table II: Frequency and percentages of astrocytoma (n=49).**

Tumor grade	Frequency	Percentage
Grade I	7	14.28%
Grade II	15	30.3%
Grade III	9	19 %
Grade IV	18	36.3%
Total	49	100%

## DISCUSSION

Although tumors of the Central Nervous System (CNS) are not common, but the incidence is increasingly rapidly. The world wide incidence of primary malignant brain tumors in 2008 was 3.8 per 100,000 in males and 3.1 per 100,000 in females. In UK primary brain tumors constitutes about 1.6% of all tumors. It has been estimated in UK. that life time risk of of brain tumors in developing brains is 1 in 133 for men and 1 in 185 for women in UK.<sup>9,14</sup> Little data is available regarding CNS tumors in Pakistan. The majority of CNS patients die with in the first year of diagnosis and less than 3% survive more than three since diagnosis.<sup>11,15,16</sup>

This study shows age range of 09 to 70 years. In studies conducted by Ahsan et al<sup>3</sup> in 2015, Butt et al<sup>4</sup> in 2005 and Ghanghoria et al<sup>7</sup> in 2014 showed age range of 1-85 years, 1-69 years and 2-80 years respectively. In current study male to female ratio is 1.55:1. Almost the same male dominant ratio of 1.6:1, 1.6:1, 1.17: 1 and 1: 0.86 is shown by Ahmad et al,<sup>6</sup> Ahsan et al,<sup>3</sup> Butt et al<sup>4</sup> and Ghanghoria et al,<sup>7</sup> respectively, where as Aryal et al<sup>5</sup> showed equal

male to female ratio.

In our study Astrocytoma was the commonest tumor 49 (46.22%) cases followed by Meningioma 22 (20.75%) cases, Oligodendroglioma and Medulloblastoma each 6 (5.66%) cases, mixed Oligoastrocytoma Pituitary adenoma and Ependymoma each 5 (4.71%) cases, 2 (1.88%) cases each Germ cell tumors, Hemangioblastoma, and Craniopharyngioma. Also one each case (0.94%) of Chordoma and Central neurocytoma was present. A study conducted by Butt et al<sup>4</sup> showed Astrocytoma as the commonest tumor 41% followed by Meningioma 23%. Also in a study conducted by Ahsan et al<sup>3</sup> in showed Astrocytoma 56% followed by Meningioma 28%, Pituitary adenoma 2.6% and Germ cell tumor 0.1%. In a study conducted in China by Chen et al<sup>8</sup> showed Astrocytoma as the commonest tumor 38% followed by meningioma 36%, pituitary adenoma 4.1% and germ cell tumor 1.3%. Another study conducted by Lee et al<sup>9</sup> in Korea showed meningioma as the commonest tumor 31.2% followed by astrocytoma 19.4%, pituitary adenoma 15.8% and germ cell tumor 1.8%. Also a study conducted by Ghanghoria et al<sup>7</sup> in India showed meningioma as the commonest tumor 41.54% followed by Astrocytoma 24.61% as the 2<sup>nd</sup> common tumor followed by ependymoma 7.71%, medulloblastoma and craniopharyngioma each 6.15% and hemangioblastoma 3.07%.

In this study amongst, the 49 cases of Astrocytoma 7 (14.28%) cases are Grade I, followed by 15 (30.6%) cases of Grade II, 9 (19%) cases of Grade III and 18 (36.73%) cases of Grade IV astrocytomas. In a study, conducted by Ahsan et al<sup>3</sup> in Rawalpindi Grade I Astrocytoma were 4.9% followed by 17.8% of Grade II Astrocytoma, 5.6% Grade III Astrocytoma and 40.4% were Grade IV Astrocytomas, which is somewhat different from this study may be due to subjective differences in grading system.

In a study conducted by Ahmad et al<sup>6</sup> in Karachi showed Grade I Astrocytoma 15.10% followed by Grade II Astrocytoma 22.65% and Grade III and IV combined 60.41%. This study is somewhat near to the present study.

Another study conducted by Butt et al,<sup>4</sup> at Lahore showed combined Grade I and II Astrocytoma 46.3% followed by Grade III Astrocytoma 21.9% and Grade IV Astrocytoma 14.6%. This study is

also having different frequencies amongst the different grades of Astrocytomas.

## CONCLUSION

Astrocytomas are the commonest tumors in our study, followed by Meningiomas, Further studies about the CNS tumors are required especially regarding the early diagnosis and management.

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