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CENTRAL NERVOUS SYSTEM TUMORS IN IRAQI PATIENTS WITH CLINICOPATHOLOGICAL CORRELATION

[*1]Fatimah Ahmed Abdulridha and [2]Dr. Wissam A. Lateef

Baghdad Medical City, Baghdad, Iraq.

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***Corresponding Author: Fatimah Ahmed Abdulridha**

Baghdad Medical City, Baghdad, Iraq.

ABSTRACT

Introduction: Neoplasm of central nervous system considered the main problems in health system, it lead to many neurological deficits and related to opposed prognosis so it need to know the prevalence of illness to early treatment and prevention. The aim of this study was to investigate the clinicopathological correlation for brain glioma, it's relation to age, and gender, site, size and grade in patients underwent incisional and excisional brain biopsies. **Method:** The cross sectional study, pathology reports of a 200 patients underwent surgery for removing brain masses and sent for pathology laboratory were collected from the archive of the teaching laboratories of Ghazi Al Hariri hospital in Baghdad/Iraq in the period from January 2019 to October 2021. The histopathology reports were including age and gender of the patients, site of the surgical procedure, size of the biopsy. All the biopsied materials were fixed in 10% formalin solution, undergo routine tissue processes, were embedded into paraffin blocks and stained with hematoxylin and eosin stains. **Results:** mean age (34.1 ± 20) years old, mean tumor size (3.5 ± 2.4). 38 (19%) of patients at age group 21-30 years, 35 (17.5%) of patients at age group 41-50 years old, 117 (58.5%) of patients are males and 83 (41.5%) of patients are females, 117 (58.5%) of patients with size of tumor <3mm, 140 (70%) of patients the tumor location in Cerebral hemisphere and 29 (14.5%) at posterior fossa. 83 (41.5%) of patients at grade 4 and 55 (27.5%) of patients at grade 2. There is significant association between age > 60 years, male gender, size ≥ 3 mm site and grade 4 with histopathological diagnosis. **Conclusion:** There is high clinicopathological correlation for brain glioma, Glioblastoma Multiforme associate with age more than 60 years, male gender, cerebral hemisphere and thalamic site, tumor size ≥3mm, and grade 4.

KEYWORDS: Brain Glioma, Clinicopathological Correlation, age, gender, size, site, grade.

INTRODUCTION

Neoplasm of central nervous system considered the main problems in health system, it lead to many neurological deficits and related to opposed prognosis so it need to know the prevalence of illness to early treatment and prevention.[1] Tumor of central nervous system establishes 1-2% of entirely tumors, it classified according to site, shape and appearance, growth and development.[2] These characterize the second utmost public tumors, represented 2-5% of entirely tumors, about 80% in brain and 20% in spinal cord.[3,4] 80% of malignancy of brain are primary in origin and the rest 20% of tumor occur due to metastasis.[5] Therefore, fast intraoperative diagnosis assistances to define the finest technique and the endpoint of the procedure.[6] Types of glioma include: Astrocytomas, including astrocytoma, anaplastic astrocytoma and glioblastoma. Ependymomas, including anaplastic ependymoma, myxopapillary ependymoma and subependymoma. Oligodendrogliomas, including oligodendroglioma, anaplastic oligodendroglioma and anaplastic oligoastrocytoma. A glioma affect the brain function and might be life threatening depending on its location and rate of growth, they are one of the most common types of primary brain tumors. The type of glioma helps to determine treatment and prognosis. Treatment options includes surgery, radiation therapy, chemotherapy and targeted therapy.[7] Glioblastoma (GBM) is the most common primary brain tumor in adults.[8,9] Age is one of the primary risk factors for cancer, with individuals ≥65 years of age accounting for 60% of newly diagnosed malignancies and 70% of all cancer-related deaths.[10] The incidence and mortality rate of GBM increases during advanced aging with a median diagnosis at 64 years. Aging is a compound procedure that disturbs the immune system.[11,12] (61%) of primary gliomas happen in the 4 brain lobes.[13] GBMs consequent exclusively from glial cells. These cells are at numerous phases of

variation from stem cell to neuron to glia, with phenotypic differences determined.[14] GBMs classified as primary recognized as precursor; or secondary, a low-grade tumor alters into GBM. Bulks of GBMs are primary, in older aged patients and have a minor prognosis than secondary GBMs.[15] A recognize of specific relations of this illness with ecological and occupational contact have mainly unconvincing and underpowered. Ionizing radiation lead to an increased threat of glioma growth.[16] Other environmental exposures to vinyl chloride, pesticides, smoking, petroleum refining, and synthetic rubber manufacturing have been loosely associated with the development of gliomas. Electromagnetic fields, formaldehyde, and nonionizing radiation from cell phones have not been proven to lead to GBM.[17] The appearance of a patient with anew identified GBM dependent on the tumor size and location, anatomic buildings of site involve in brain lead to increased intracranial pressure, and this cause headache and local or advanced neurologic discrepancies.[18]

The aim of this study was to investigate the clinicopathological correlation for brain glioma, it's relation to age, and gender, site, size and grade and histological types in patients underwent incisional and excisional brain biopsies.

METHOD

The cross sectional study, pathology reports of a 200 patients underwent surgery for removing brain masses and sent for pathology laboratory were collected from the archive of the teaching laboratories of Ghazi Al Hariri hospital in Baghdad/Iraq in the period from January 2019 to October 2021. The histopathology reports were including age and gender of the patients, site of the surgical procedure, size of the biopsy. All the biopsied materials were fixed in 10% formalin solution, undergo routine tissue processes, were embedded into paraffin blocks and stained with hematoxylin and eosin stains. Statistical analysis done by SPSS V 22, percentage and frequency used for categorical data, mean, median and SD for continuous data. Chi-square used for assessed association between variables. P-value less or equal to 0.05 is consider significant.

RESULTS

Cross sectional study of 200 patients, age range (1-77 years), mean age (34.1 ± 20) years old, tumor size range (1-12 mm) mean size of tumor (3.5 ± 2.4 mm). 38 (19%) of patients at age group 21-30 years, 35 (17.5%) of patients at age group 41-50 years old, 117 (58.5%) of patients are males and 83 (41.5%) of patients are females, 117 (58.5%) of patients with size of tumor <3mm, 140 (70%) of patients the tumor location in Cerebral hemisphere and 29 (14.5%) at posterior fossa. 83 (41.5%) of patients at grade 4 and 55 (27.5%) of patients at grade 2. As show in table 1.

Table 1: distribution of patients according to variables of study.

variables		frequency	percentage
age groups	**21-30**	38	19.0
	41-50	35	17.5
	1-10	32	16.0
	51-60	28	14.0
	31-40	25	12.5
	11-20	24	12.0
	>60	18	9.0
gender	**Male**	117	58.5
	female	83	41.5
size	**<3mm**	117	58.5
	≥ 3 mm	83	41.5
site	**Cerebral hemisphere**	140	70.0
	Posterior fossa	29	14.5
	Spinal cord	13	6.5
	Supra sellar mass	10	5.0
	Optic nerve lesion	5	2.5
	Thalamic mass	3	1.5
grade	**4**	83	41.5
	2	55	27.5
	3	36	18.0
	1	26	13.0

In fig 1, 83 (41.5%) of patients have Glioblastoma M., 42 (21%) of patients have diffuse Astrocytoma, and so on.

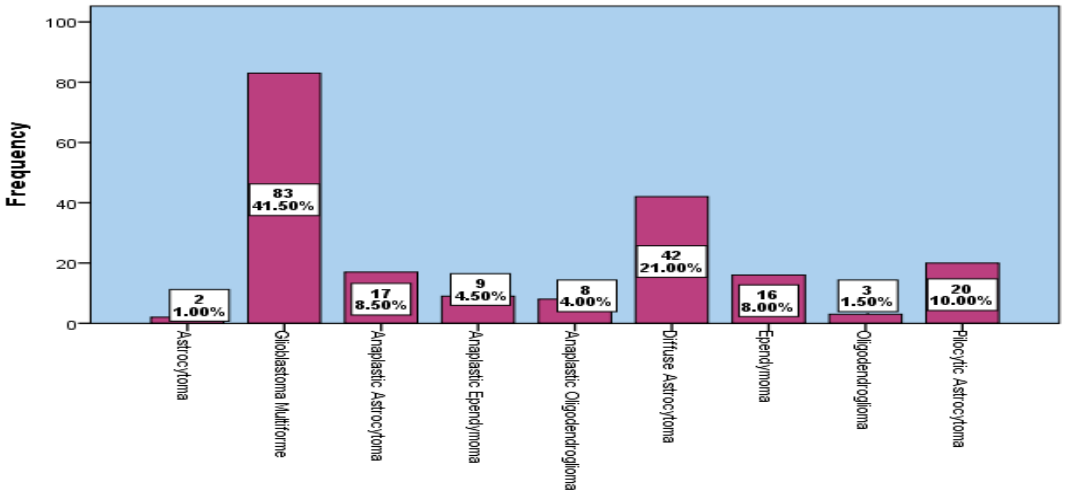

Fig 1: Histopathological Diagnosis.

There is significant association between age groups of patients and histopathological diagnosis. (66.7%) of patients > 60 years old diagnosed as Glioblastoma Multiforme, (33.3%) of patients > 60 years old diagnosed as Diffuse Astrocytoma. As in table 2.

Table 2: Association Between Age Groups of Patients and Histopathological Diagnosis.

Diagnosis				**Age**			
	1-10	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**>60**
Astrocytoma	0	1	1	0	0	0	0
	0.0%	4.2%	2.6%	0.0%	0.0%	0.0%	0.0%
Glioblastoma Multiforme	2	5	14	14	18	18	12
	6.3%	20.8%	36.8%	56.0%	51.4%	64.3%	66.7%
Anaplastic Astrocytoma	0	2	3	4	6	2	0
	0.0%	8.3%	7.9%	16.0%	17.1%	7.1%	0.0%
Anaplastic Ependymoma	2	2	3	1	0	1	0
	6.3%	8.3%	7.9%	4.0%	0.0%	3.6%	0.0%
Anaplastic Oligodendroglioma	2	0	0	3	2	1	0
	6.3%	0.0%	0.0%	12.0%	5.7%	3.6%	0.0%
Diffuse Astrocytoma	7	5	11	3	5	5	6
	21.9%	20.8%	28.9%	12.0%	14.3%	17.9%	33.3%
Ependymoma	3	5	5	0	2	1	0
	9.4%	20.8%	13.2%	0.0%	5.7%	3.6%	0.0%
Oligodendroglioma	0	1	0	0	2	0	0
	0.0%	4.2%	0.0%	0.0%	5.7%	0.0%	0.0%
Pilocytic Astrocytoma	16	3	1	0	0	0	0
	50.0%	12.5%	2.6%	0.0%	0.0%	0.0%	0.0%
Total	32	24	38	25	35	28	18
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

P=0.0001. P-value ≤0.05 (significant)

There is significant association between gender and histopathological diagnosis. (45.3%) of patients of males diagnosed as Glioblastoma Multiforme, (21.7%) of males diagnosed as Diffuse Astrocytoma, (11.1%) of patients of males diagnosed as Anaplastic Astrocytoma. As in table 3.

Table 3: Association Between Gender and Histopathological Diagnosis.

histopathological diagnosis	Gender	
	female	Male
Astrocytoma	0	2
	0.0%	1.7%
Glioblastoma Multiforme	30	53
	36.1%	45.3%
Anaplastic Astrocytoma	4	13
	4.8%	11.1%
Anaplastic Ependymoma	4	5
	4.8%	4.3%
Anaplastic Oligodendroglioma	5	3
	6.0%	2.6%
Diffuse Astrocytoma	18	24
	21.7%	20.5%
Ependymoma	4	12
	4.8%	10.3%
Oligodendroglioma	3	0
	3.6%	0.0%
Pilocytic Astrocytoma	15	5
	18.1%	4.3%
Total	83	117
	100.0%	100.0%

P=0.006. P-value ≤0.05 (significant)

There is significant association between site of tumor and histopathological diagnosis. **(**55.7%) of patients with cerebral hemisphere have Glioblastoma Multiforme diagnosis, (66.7%) of patients with thalamic mass have Diffuse Astrocytoma diagnosis, (53.8%) of patients with Spinal cord have Ependymoma diagnosis. As in table 4.

Table 4: association between site and histopathological diagnosis.

Diagnosis	Cerebral hemisphere	Optic nerve lesion	Posterior fossa	Spinal cord	Supra sellar mass	Thalamic mass
Astrocytoma	1 0.7%	0 0.0%	1 3.4%	0 0.0%	0 0.0%	0 0.0%
Glioblastoma Multiforme	78 55.7%	0 0.0%	3 10.3%	2 15.4%	0 0.0%	0 0.0%
Anaplastic Astrocytoma	14 10.0%	0 0.0%	2 6.9%	0 0.0%	0 0.0%	1 33.3%
Anaplastic Ependymoma	1 0.7%	0 0.0%	7 24.1%	1 7.7%	0 0.0%	0 0.0%
Anaplastic Oligodendroglioma	8 5.7%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Diffuse Astrocytoma	30 21.4%	1 20.0%	4 13.8%	3 23.1%	2 20.0%	2 66.7%
Ependymoma	2 1.4%	0 0.0%	7 24.1%	7 53.8%	0 0.0%	0 0.0%
Oligodendroglioma	3 2.1%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Pilocytic Astrocytoma	3 2.1%	4 80.0%	5 17.2%	0 0.0%	8 80.0%	0 0.0%
Total	140 100.0%	5 100.0%	29 100.0%	13 100.0%	10 100.0%	3 100.0%

P=0.0001. P-value ≤0.05 (significant)

There is significant association between size of tumor and histopathological diagnosis. (47%) of patients of with tumor size ≥3mm diagnosed as Glioblastoma Multiforme, (14.5%) of patients with tumor size ≥3mm diagnosed as Ependymoma. As in table 5.

Table 5: association between size of tumor and histopathological diagnosis.

histopathological diagnosis	size	
	<3mm	≥3mm
Astrocytoma	2	0
	1.7%	0.0%
Glioblastoma Multiforme	44	39
	37.6%	47.0%
Anaplastic Astrocytoma	15	2
	12.8%	2.4%
Anaplastic Ependymoma	4	5
	3.4%	6.0%
Anaplastic Oligodendroglioma	2	6
	1.7%	7.2%
Diffuse Astrocytoma	32	10
	27.4%	12.0%
Ependymoma	4	12
	3.4%	14.5%
Oligodendroglioma	3	0
	2.6%	0.0%
Pilocytic Astrocytoma	11	9
	9.4%	10.8%
Total	117	83
	100.0%	100.0%

P=0.0001. P-value ≤0.05 (significant)

There is significant association between grade of tumor and histopathological diagnosis. (100%) of patients of with grade 4 diagnosed as Glioblastoma Multiforme, (47.2%) of with grade 3 diagnosed as Anaplastic Astrocytoma. As in table 6.

Table 6: association between grade and histopathological diagnosis.

histopathological diagnosis	Grade			
	1	2	3	4
Astrocytoma	0	0	2	0
	0.0%	0.0%	5.6%	0.0%
Glioblastoma Multiforme	0	0	0	83
	0.0%	0.0%	0.0%	100.0%
Anaplastic Astrocytoma	0	0	17	0
	0.0%	0.0%	47.2%	0.0%
Anaplastic Ependymoma	0	0	9	0
	0.0%	0.0%	25.0%	0.0%
Anaplastic Oligodendroglioma	0	0	8	0
	0.0%	0.0%	22.2%	0.0%
Diffuse Astrocytoma	0	42	0	0
	0.0%	76.4%	0.0%	0.0%
Ependymoma	5	11	0	0
	19.2%	20.0%	0.0%	0.0%
Oligodendroglioma	1	2	0	0
	3.8%	3.6%	0.0%	0.0%
Pilocytic Astrocytoma	20	0	0	0
	76.9%	0.0%	0.0%	0.0%
Total	26	55	36	83
	100.0%	100.0%	100.0%	100.0%

P=0.0001. P-value ≤0.05 (significant)

DISCUSSION

In current study the mean age (34.1 ± 20) years old, mean tumor size (3.5 ± 2.4). 38 (19%) of patients at age group 21-30 years, 35 (17.5%) of patients at age group 41-50 years old, this similar to other study that show also the mean of age 40.43 years and the peak incidence was

seen between 41 to 60 years with majority of cases (43.33%).[11,19] Zhiying Lin et al. agreed with our results and state that the age range was 1-82 years and the mean age was 38 years.[20] In current study, most of patients are men this is agree with Zhiying Lin et al. have (58%) man patients and (42%) woman patients.[1,20] In current study (58%) of patients with size of tumor <3mm, (70%) of patients the tumor location in Cerebral hemisphere and (14.5%) at posterior fossa (41.5%) of patients at grade IV and (27.5%) of patients at grade II, this results agreed with other study state that (9.1%) patients were categorized as grade I, (36%) were categorized as grade II, 3(25%) were categorized as grade III, and (30%) were categorized as grade IV.[20], The mean size of glioma was 5 ± 2 cm.[20] Gliomas were positioned further commonly in the right than in the left hemisphere.[21] In current study the most glioma types occur is Glioblastoma M. and then Astrocytoma, this is also agreed with other study that stated the occurrences of astrocytic tumors more than three other types of gliomas.[22] Anaplastic astrocytomas incidence is 8%, and oligodendrogliomas incidence is 10% of entirely primary brain and CNS gliomas.[21,22]

In current study, there is significant association between age groups (> 60 years) and Glioblastoma Multiforme, this is agreed with other study stated that the tumor-prone sites, histopathology, prognosis and molecular indicators are dissimilar in patients with glioma at variant ages[23], Growing study state that GBM in ageing patients are further hostile than in young.[20,24] In current study there is significant association between male gender and Glioblastoma Multiforme, this is also agreed with other study that show Researchers have known for decades that men are more likely than women to develop an aggressive form of brain cancer called glioblastoma. There is also evidence that women tend to respond better than men to standard therapy for this disease.[25,26]

In current study show, most of patients with cerebral hemisphere have Glioblastoma Multiforme diagnosis, and then patients with thalamic mass have Diffuse Astrocytoma diagnosis, this is agreed with Suvi Larjavaara et al. that state most (86%) of the gliomas were situated in the cerebral lobes. "Gliomas in the frontal lobe 40%, temporal lobe 29%, parietal lobe 14%, and occipital lobe 3.0%". In adding, 6% were situated mainly in the deep cerebrum, 2% in the ventricles, 1% in the cerebellum, and 4.1% in the brainstem.[21] The maximum public symptoms were motor deficits and/or symptoms of intracranial hypertension, due to occur in motor pathways and CSF obstacle cause hydrocephalus.[27] In current study most of patients with tumor size ≥ 3mm diagnosed as Glioblastoma Multiforme, Zhiying Lin et al. agreed our results that state the proportion of tumors with sizes of 0–4 cm decreased with age; however, the proportion of tumors with sizes ranging from 4 to 6 cm was larger in older groups ($p = 0.018$).[20] heavy tumor problem is (tumor size > 4 cm). Astrocytoma is the most public in pediatrics, while glioblastoma occur more in adult groups. Numerous revisions have confirmed that patients with a advanced grade of glioma have a poorer consequence.[28] In current, study most of the patients with grade 4 growing of tumor diagnosed as Glioblastoma Multiforme, Andre Lona et al state similar results it shows that the histopathological picture with the Grade IV.[29] This agree with Lapointe et al.[30], which stated that the higher the glioma grade have poor prognostic value. Krisnan et al. stated that there was a significant association between stage and histopathologic structures on survival in patients with glioma and high life expectation.[31] Among meningioma, WHO Grade I were the commonest 16 cases (94.12%) and among the Astrocytoma, Glioblastoma Multiforme (grade IV) were the commonest 8 cases (53.33%).[1,32,33]

CONCLUSION

There is high clinicopathological correlation for brain glioma, Glioblastoma Multiforme associate with age more than 60 years, male gender, cerebral hemisphere and thalamic site, tumor size ≥3mm, and grade IV.

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