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Characteristics of Astrocytoma in Indonesia

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Abstract
Astrocytoma is a primary brain tumor originating from astrocyte cells. The study was conducted using scientific literature review methods from various sources such as google search and google scholar with relevant keywords such as "prevalensi astrositoma di indonesia", "kejadian astrositoma di indonesia", "prevalence of astrocytoma in Indonesia", and "epidemiology primary brain tumor in Indonesia". After reading the titles and abstracts of the articles found, there were five research articles that met the criteria. From this literature study, there were 269 cases of astrocytoma in several hospitals in Indonesia in 2007-2018. At RSUP Dr. Hasan Sadikin Bandung in 2007–2009 astrocytomas were most commonly found in patients aged 20–34 years. In 2010–2012 astrocytoma was most commonly found in patients aged 31–40 years. And in 2013-2016 astrocytomas were most commonly found in patients aged 46 to 55 years. While at RSUP Dr. Wahidin Sudirohusodo in 2016 most astrocytomas were found in patients aged 20-29 years. Astrocytoma at RSUP Dr. Hasan Sadikin Bandung in 2007-2009 was mostly located in the frontal area, in 2010-2012 astrocytoma was mostly located in the cerebral hemispheres, and in 2013-2016 astrocytoma was mostly located in the cerebellum. At RSUP Dr. Wahidin Sudirohusodo astrocytoma mostly located in frontotemporal. At RSUP Dr. Hasan Sadikin Bandung astrocytoma is more often found in men, while in RSUP. Dr. Wahidin Sudirohusodo astrocytoma is more common in female patients.
Keywords: *Astrocytoma; Incidence; Gender; Indonesia*

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Introduction

A tumor is an abnormal mass of tissue that grows excessively and uncontrollably and continues to grow even when the triggering stimulus is stopped (Willis, 1960). Glioma is one type of tumor located in the central nervous system (CNS), gliomas originate from glial cells, glial cells are components of the nervous system that support neuron function. Glial cells consist of oligodendrocytes, astrocytes, ependymal cells, microglial cells, Schwann cells, and satellite cells (Mescher, 2013). Astrocyte cells can only be found in the CNS, tumors originating from astrocytes are called astrocytomas (Mescher, 2013).

Astrocytomas can grow in any part of the brain, brainstem, and spinal cord (American Brain Tumor Association, 2020). Tumors in the CNS can spread by various mechanisms, but usually CNS tumors that recur are located not far from the previous location, less than 10% are located far from the previous location (Greenberg & Arredondo, 2006).

Glioma is the most common CNS tumor, accounting for 81% of all CNS tumors. The incidence of CNS tumors is gliomas and 45% of all gliomas are grade 4 astrocytomas or commonly called glioblastoma multiform (GBM). The worldwide incidence of astrocytoma is 3.5 million people/year (Smoll & Hamilton, 2014). Diffuse astrocytoma and GBM are the most common types of astrocytoma (Tork & Atkinson, 2021).

The incidence of astrocytoma increases with age and peaks in the 75-84 year age group. It is not known with certainty the effect of age on the incidence of astrocytoma but it is known that with age there is an increase in mRNA expression associated with immunoregulation, namely immunosuppressive indoleamine 2,3 dioxygenase (IDO) and programmed death-ligand 1 (PD-L1) as well as an increase in CD11c in the brain resulting is a dendritic cell surface marker coinciding with an increase in immunosuppressive regulatory T cells and a decrease in CD8+ T cells in peripheral vasculature which is thought to be associated with the incidence of GBM (Ladomersky et al., 2019).

Gliomas (including astrocytomas) are more common in men than women, except in pilocytic astrocytomas (Ostrom et al., 2014). Hormonal influences are thought to be associated with the incidence of gliomas, but hormonal influences as risk factors for gliomas are still being debated. The study by Cowppli-Bony et.al. concluded that female hormones have a protective effect against gliomas but are a risk factor for meningiomas, whereas the study conducted by Michaud DS et. al. found the opposite, there was no relationship between hormones in women and the incidence of glioma (Florian et al., 2013).

There is no literature review that discusses the characteristics of astrocytoma in Indonesia. Therefore, it is necessary to review the literature on the characteristics of astrocytomas in Indonesia to determine the characteristics of astrocytomas in Indonesia and as a reference for research on astrocytomas.

Objectives

The purpose of this study was to determine the characteristics of astrocytoma in Indonesia.

Method

The study was conducted using scientific literature review methods from various sources such as Google search and google scholar with relevant keywords such as "incidence of glioma in Indonesia", "prevalence of astrocytoma in Indonesia", "incidence of astrocytoma in Indonesia", "Indonesia".prevalence of astrocytoma in Indonesia", and "Etiology of primary brain tumors in Indonesia". After reading the titles and abstracts of the articles found, there were five research articles that matched the criteria.

Result

In this study, five research articles were used that discussed the characteristics of astrocytoma in various hospitals in Indonesia. Each scientific literature discusses the incidence of astrocytoma (five articles), the most common location (two articles), the age at which astrocytoma was diagnosed (two articles), and the sex with the most diagnosed astrocytoma (two articles). The results of this study can be seen in Table 1.

Discussion

Incidence of astrocytoma

Incidence of astrocytoma in Dr. RSUP. Hasan Sadikin Bandung in 2007-2009 as many as 46 cases, in 2010-2012 as many as 21 cases, and in 2013-2016 as many as 25 cases. The most common histopathological diagnosis in 2013-2016 was grade 1 polycystic astrocytoma, which was 14 cases (56%), the second most was GBM with 8 cases (32%). Pilimiyxois grade 1 astrocytoma, pleomorphic xanthoastrocytoma, grade IIIor astrocytoma anaplastic astrocytoma were found in one case each.

At the Abdul Moeloek Regional General Hospital (RSUDAM) and Immanuel Hospital Bandar Lampung in 2009-2013, there were 50 cases of astrocytoma from 173 cases of brain tumors diagnosed in the two hospitals in 2009-2013. At RSUP Dr. Wahidin Sudirohusodo Makassar in 2016 found 47 cases of astrocytoma. Based on the histological type, GBM was the most common astrocytoma case, with 6 cases (50%). In second place was pilocytic astrocytoma with 4 cases (33.33%) followed by diffuse astrocytoma and anaplastic astrocytoma with 1 case each (8.33%).

In Sanglah Hospital, Denpasar in 2014-2018, there were 68 cases of astrocytoma from 84 cases of glioma. Based on the histopathological type, GBM was the most common type of astrocytoma, which was 45 cases out of 68 astrocytoma cases (66.1%). Pilocytic astrocytoma was the second most common type of astrocytoma with 13 cases (19.1%). Fibrillary astrocytoma was found in 5 cases (7.3%), diffuse astrocytoma in 2 cases (2.9%), and gemistocytes astrocytoma, high-grade diffuse astrocytoma, pilomyxoid astrocytoma in one case each (1.47%)

At dr. Kariadi Hospital Semarang in 2015-2018, there were 47 cases of astrocytoma. GBM is the most common type of astrocytoma with 18 cases, in second place is grade 2 astrocytoma which consists of plomyxoid, microcytic, gesmitocytic, and pilocytic astrocytoma as many as 13 cases, the third-order is grade 2 astrocytoma consisting of diffuse, fibrillary, low grade, oligoastrocytoma, and arotoplasmic astrocytoma were 11 cases, the rarest type of astrocytoma was grade 3 astrocytoma or anaplastic astrocytoma which was 9 cases. The incidence of astrocytoma can be seen in Table 2.

The incidence of astrocytoma by age group

At RSUP Dr. Hasan Sadikin Bandung in 2007 – 2009 astrocytoma was most commonly found in patients aged 20-34 years. In 2010 – 2012 astrocytoma was most commonly found in patients aged 31-40 years. In 2013-2016, most astrocytomas were found in patients aged 46 to 55 years, the average age at diagnosis was 32 years. The youngest astrocytoma cases were found in children aged 5 years as many as 2 cases while the oldest cases were found at the age of 66 years in one case.

At RSUP Dr. Wahidin Sudirohusodo in 2016 astrocytomas were most commonly found in patients aged 20-29 years, in second place in the 30-39 age group, the 50-59 year age group, and the >60 year age group. The incidence of astrocytoma by age group can be seen in Table 3.

The incidence of astrocytoma

based on the location of tumors astrocytomain Dr. RSUP. Hasan Sadikin Bandung in 2007-2009 mostly located in the frontal (16.67%), in 2010-2012 the most located in the cerebral hemispheres (76.19%) with a specific location in the frontal as many as 3 cases (28.54%). followed by parietal in 4 cases (19.04%). In 2013-2016 the most astrocytomas were located in the cerebellum (32%), followed by parietal (5%), frontoparietal (3%), frontotemporal, temporo-parietal, and frontal respectively 8%, occipital, parieto-occipital, and temporal respectively. -4% each at RSUP Dr. Wahidin Sudirohusodo in 2016 the most astrocytomas were located in the frontal area, precisely in the frontotemporal (50%) and followed by parietal, temporal, and occipital each with 16.67%. The incidence of astrocytoma based on tumor location can be seen in Table 4.

Incidence of astrocytoma by gender

Based on the sex of the patient at Dr. RSUP. Hasan Sadikin Bandung in 2007-2016 astrocytomas was more often found in men than women. In 2007-2009, there were 24 cases (52.2%) of astrocytoma cases in men from 46 astrocytoma cases. In 2010-2012, there were 12 cases (57.14%) of astrocytoma cases in men from 21 cases of astrocytoma. And in 2013-2016 there were 16 cases (64%) of astrocytoma cases in men from 25 astrocytoma cases. While at RSUP Dr. Wahidin Sudirohusodo in 2016 more astrocytomas were found in female patients as many as 9 cases (75%) compared to men as many as 3 cases (25%). Comparison of the incidence

of astrocytoma in men and women at RSUP Dr. Hasan Sadikin Bandung 2007-2016 and RSUP Dr. Wahidin Sudirohusodo 2016 can be seen in Graph 1. and Graph 2.

Limitations

Research on the characteristics of astrocytoma in Indonesia is still very limited. The scientific literature reviewed in this literature study conducted research in several hospitals in Indonesia at different times so that it did not accurately describe the characteristics of astrocytomas in Indonesia.

Conclusion

There were 68 astrocytoma cases at Sanglah Hospital Denpasar in 2014-2018, 50 strocytoma cases at Abdul Moeloek Regional General Hospital (RSUDAM) and Imanuel Hospital Bandar Lampung in 2009-2013, 12 astrocytoma cases at RSUP Dr. Wahidin Sudirohusodo Makassar in 2016, 47 cases of astrocytoma at dr. Kariadi Semarang in 2015-2018, 46 cases in 2007-2009, 21 cases in 2010-2012, and 25 cases in 2013-2016 at Dr. Hasan Sadikin Bandung.

At RSUP Dr. Hasan Sadikin Bandung in 2007 – 2009 astrocytoma was most commonly found in patients aged 20-34 years. In 2010 – 2012 astrocytoma was most commonly found in patients aged 31-40 years. And in 2013-2016 astrocytomas were most commonly found in patients aged 46 to 55 years. While at RSUP Dr. Wahidin Sudirohusodo in 2016 most astrocytomas were found in patients aged 20-29 years.

Astrocytoma at RSUP Dr. Hasan Sadikin Bandung in 2007-2009 was mostly located in the frontal area, in 2010-2012 the most were located in the cerebral hemispheres, and in 2013-2016 the most were located in the cerebellum. At RSUP Dr. Wahidin Sudirohusodo astrocytoma mostly located in frontotemporal. At RSUP Dr. Hasan Sadikin Bandung astrocytoma is more often found in men, while in Dr. RSUP. Wahidin Sudirohusodo astrocytoma more female patients than male.

References

Ardhini, R., & Tugasworo, D. (2019). Epidemiology of primary brain tumors in dr. Kariadi Hospital Semarang in 2015-2018. *E3S Web of Conferences*, *125*, 16004.

American Brain Tumor Association. Astrocytoma. www.abta.org. [Online] 2020. https://www.abta.org/tumor_types/astrocytoma/#:~:text=Location%3A,brainstem%2C%20and%20the%20spinal%20cord..

Florian, I. S., Ungureanu, G., & Berce, C. (2013). Risk factors for gliomas: an extensive review. *Romanian Neurosurgery*, 5–21.

Greenberg, M. S., & Arredondo, N. (2006). *Handbook of neurosurgery*.

Ladomersky, E., Scholtens, D. M., Kocherginsky, M., Hibler, E. A., Bartom, E. T., Otto-Meyer, S., Zhai, L., Lauing, K. L., Choi, J., & Sosman, J. A. (2019). The coincidence between increasing age, immunosuppression, and the incidence of patients with glioblastoma. *Frontiers in Pharmacology*, *10*, 200.

Mescher, A. L. (2013). *Junqueira's basic histology: text and atlas* (Vol. 12). McGraw-Hill Medical 13th ed. New York.

Mutmainna, A. Ika Sari. Karakteristik Pasien Astrositoma di RSUP Dr. Wahidin Sudirohusodo Makasar Periode Januari-Desember 2016. digilib.unhas.ac.id. [Online] 2017.

Nugraha, A. B. (2018). *Gambaran Pasien Astrositoma Berdasarkan Usia, Jenis Kelamin, Lokasi Tumor, Manifestasi Klinis, Diagnosis Histopatologi, dan Jenis Terapi di Rumah Sakit Umum Pusat Hasan Sadikin Bandung Periode 2013-2016*.

Ostrom, Q. T., Bauchet, L., Davis, F. G., Deltour, I., Fisher, J. L., Langer, C. E., Pekmezci, M., Schwartzbaum, J. A., Turner, M. C., & Walsh, K. M. (2014). The epidemiology of glioma in adults: a "state of the science" review. *Neuro-Oncology*, *16*(7), 896–913.

Parastuta, I. K. Y., Sriwidyani, N. P., Ekawati, N. P., & Saputra, H. (n.d.). GAMBARAN KLINIKOPATOLOGI TUMOR GLIA TAHUN 2014-2018 DI RSUP SANGLAH DENPASAR. *Cerebellum*, *10*(11), 9.

Sari, E. D. Y., Windarti, I., & Wahyuni, A. (2014). Clinical Characteristics and Histopathology of Brain Tumor at Two Hospitals in Bandar Lampung. *Bosnian Journal Of Basic Medical Sciences*, 48–56.

Smoll, N. R., & Hamilton, B. (2014). Incidence and relative survival of anaplastic astrocytomas. *Neuro-Oncology*, *16*(10), 1400–1407.

Tork, C. A., & Atkinson, C. (2021). Oligodendroglioma. *StatPearls [Internet]*.

Willis, R. A. (1960). Pathology of tumours. *Pathology of Tumours., 3rd edit*.

Attachment

Table 1. Research Result

NO	Author	The type of study and the scale used.	Population and sampel	Purpose	Result
1.	(Nugraha, 2018)	*The research design used was a descriptive study*	*patients diagnosed with astrocytoma in the Neurosurgery Department of Dr. RSUP. Hasan Sadikin Bandung period 2013-2016*	*to find out the description of astrocytoma patients based on age, gender, tumor location, histopathological diagnosis, clinical manifestations, and type of therapy*	*There were 46 astrocytoma cases in 2007-2009, 21 cases in 2010-2012, and 25 cases 2013-2016 years. Astrocytoma most commonly occurs at the age of 46 to 55 years and is more common in men (64%). The most common locations were in the cerebral hemispheres (68%),*
2.	(Sari et al., 2014)	*This research is a descriptive study with a cross-sectional approach.*	*Data on all brain tumor patients at Abdul Moeloek Regional General Hospital (RSUDAM) and Immanuel Hospital Bandar Lampung in 2009-2013*	*to determine the clinical and histopathological characteristics of brain tumors at Abdul Moeloek Regional General Hospital (RSUDAM) and Hospital (Hospital) Immanuel Bandar Lampung*	*50 cases of astrocytoma were found*

3.	Mutmainna, A. Ika Sari, 2016	*The type of research used is a descriptive retrospective study. The research design used was a cross design sectional.*	*All patients diagnosed with astrocytoma at RSUP Dr. Wahidin Sudirohusodo period January - December 2016*	*Knowing the characteristics of astrocytoma patients at RSUP Dr. Wahidin Sudirohusodo period January - December 2016*	*There were 28 astrocytoma patients. The most age group is the age group 20-29 years, more female than male patients with a ratio of 1:3, astrocytomas are mostly located in the frontotemporal*
4.	(Ardhini & Tugasworo, 2019)	*The type of research used is a descriptive retrospective study. The research design used was a cross-design sectional.*	*Patients with primary brain tumors at RSUP dr. Kariadi Semarang 2015-2018*	*Knowing the epidemiology of primary brain tumors at RSUP dr. Kariadi Semarang in 2015-2018*	*There were 47 cases of astrocytoma*
5.	(Parastuta et al., n.d.)	*This type of research is a cross-sectional descriptive study*	*glioma patients at Sanglah Hospital Denpasar in 2014 – 2018*	*To find out the clinicopathological description of glial tumors at Sanglah Hospital Denpasar*	*there were 68 cases of astrocytoma*

Table 1. Incident of Astrocytoma

No	Research Sites	Years	Type of Astrocytoma	Amount of Cases	%
1	RSUP Dr. Hasan Sadikin Bandung	2007-2009	-	46	100%
		2010-2012	-	21	100%
		2013-2016	Polisitik astrositoma derajat 1	14	56%
			Glioblastoma multiforme	8	32%
			Pilimiyxois astrositoma	1	4%
			Anaplastic astrocytoma	1	4%
			Pleomorphic xanthoastrocytoma	1	4%
			Total	25	100%
2	*Rumah Sakit Umum Daerah Abdul Moeloek (RSUDAM)*	2009-2013	-	50	100%

	and Imanuel Hospital Bandar lampung				
3	RSUP Dr. Wahidin Sudirohusodo Makasar	2016	GBM	6	50%
			Pilocytic strocytoma	4	33,33%
			Diffuse astrcytoma	1	8,33%
			Anaplastic astrocytoma	1	8,33%
			Total	12	100%
4	RSUP Sanglah Denpasar	2014-2018	GBM	45	66,1%
			Pilocytic astrocytoma	13	19,1%
			Fibrillary astrocytoma	4	7,3%
			Diffuse astrocytoma	2	2,9%
			Gemistocytic astrocytoma	1	1,47%
			High grade diffuse astrocytoma	1	1,47%
			Pilomyxoid astrocytoma	1	1,47%
			Total	68	100%
5	dr. Kariadi Hospital Semarang	2015-2018	GBM	18	38,29%
			Astrositoma derajat 1	13	27,65%
			Astrositoma derajat 2	11	23,4%
			Anaplastik astrositoma	9	19,14%
			Total	47	100%
Total of astrocytoma cases				269	

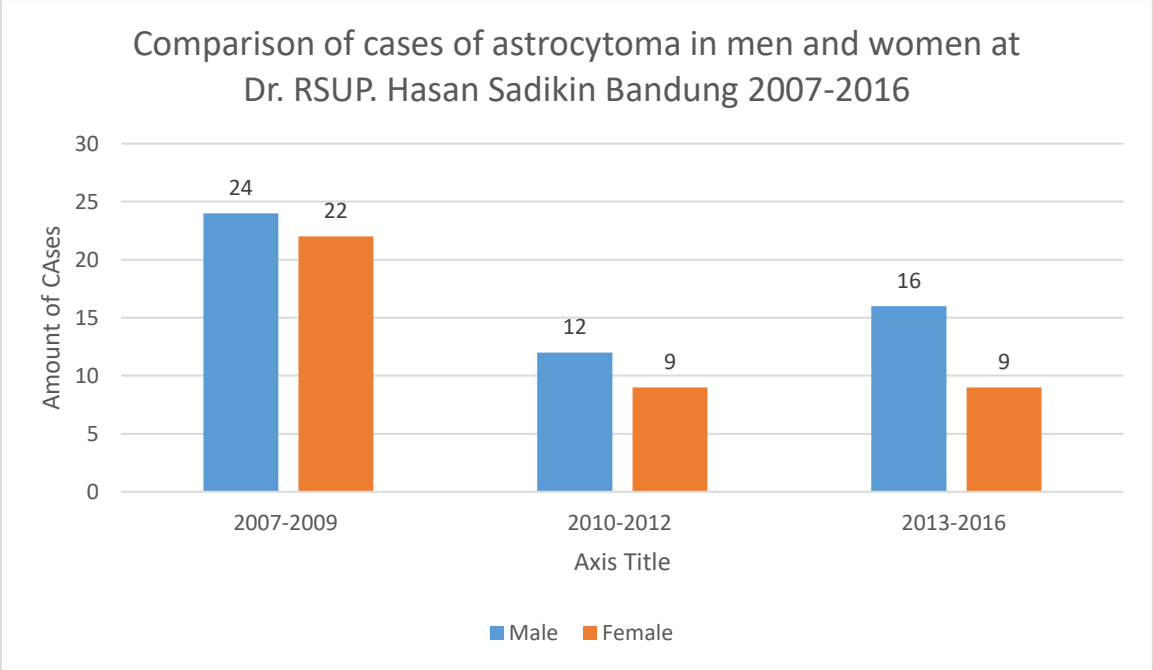
Table 2. Incidence of astrocytoma by age group

No	Location	Years	Age range	Amount of Cases	%
1	RSUP Dr. Hasan Sadikin Bandung	2013-2016	0-5 tahun	2	8%
			6-11 tahun	3	12%
			12-16 tahun	4	16%
			17-25 tahun	3	12%
			26-35 tahun	1	4%
			39-45 tahun	4	16%
			46-55 tahun	5	20%
			56-65 tahun	2	8%
			>65 tahun	1	4%
			Total	25	100%
2	RSUP Dr. Wahidin Sudirohusodo	2016	0-9 tahun	1	8,33%
			10-19 tahun	0	0%
			20-29 tahun	4	33,33%
			30-39 tahun	2	16,67 %
			40-49 tahun	1	8,33%
			50-59 tahun	2	16,67 %
			>60 tahun	2	16,67 %
			Total	12	100%

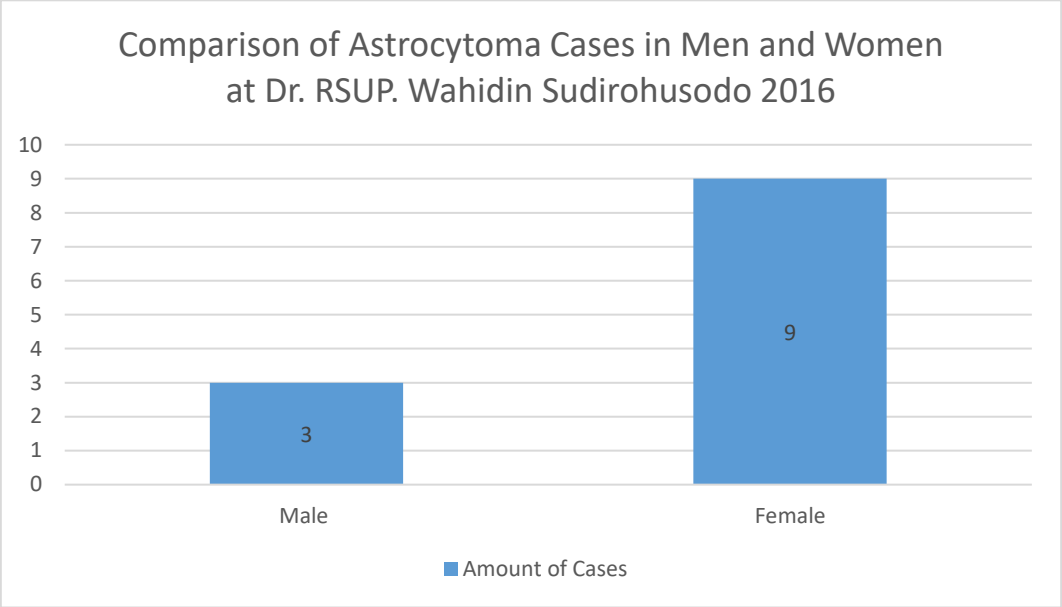
Table 3. Incidence of astrocytoma based on tumor location.

No	Location	Years	Location of tumor	Amount of cases	%

1	RSUP Dr. Hasan Sadikin Bandung	2013-2016	Serebelum	8	32%
			Parietal	5	20%
			Frontoparietal	3	12%
			Frontotemporal	2	8%
			Temporoparietal	2	8%
			Frontal	2	8%
			Oksipital	1	4%
			Parietooksipital	1	4%
			Temporal	1	4%
			Total	25	100%
2	RSUP Dr. Wahidin Sudirohusodo	2016	Frontalis	6	50%
			Parietal	2	16,67%
			Temporal	2	16,67%
			Occipital	2	16,67%
			Total	12	100%



Graph 1. Comparison of Astrocytoma Cases in Men and Women at Dr. RSUP. Hasan Sadikin Bandung 2007-2016



Graph 2. Comparison of Astrocytoma Cases in Men and Women at Dr. RSUP. Wahidin Sudirohusodo 2016