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Characteristics of Brain Tumor Patients at Dr. J. Leimena General Hospital From 2021-2024

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Abstract

Background: Brain tumors are intracranial neoplasms that affect neurological function and patients' quality of life. Although their incidence is lower than that of lung and breast cancer, brain tumors are progressive and have a high mortality rate. Both benign and malignant tumors can cause serious complications due to limited space within the skull and their proximity to vital functional centers. To date, there has been no research on the characteristics of brain tumor patients in Ambon City. **Objectives:** This study aims to describe the characteristics of brain tumor patients at Dr. J. Leimena General Hospital from 2021 to 2024 based on age, sex, clinical symptoms, type, and location of the tumor. **Method:** Quantitative descriptive with a cross-sectional approach, using medical records with total sampling technique. **Results:** The most common age group was 56-65 years (36.1%), female (63.9%), and the most frequent clinical symptom was headache (32.8%). The most common tumor type was extra-axial (50.8%), and the most frequent tumor location was in the frontal lobe (39.3%). **Conclusion:** Brain tumor patients are predominantly aged 56-65 years, mostly female, with headache as the most common symptom. The most frequent tumor type was extra-axial, most commonly located in the frontal lobe.

Keywords: Brain Tumor; Tumor Location; Type of Tumor; Patient Characteristics.

Introduction

Tumors, or neoplasms, are pathological disorders caused by uncontrolled cell growth and loss of normal physiological function. Tumors in the brain can cause both local and general symptoms[1]. Local symptoms occur when a tumor damages a specific part of the brain or presses on surrounding tissue, thereby disrupting the function of that area of the brain and reducing blood flow[2]. Involvement of specific lobes of the brain can result in more specific local symptoms[3]. Brain tumors, as type of intracranial neoplasm, significantly affect neurological function and patients' quality of life[4]. Although their incidence is lower than that of lung or breast cancer, brain tumors are typically progressive and associated with high mortality rates[5]. Unlike tumors in other organs, both benign and malignant brain tumors can cause severe clinical problems because of their growth within the limited intracranial space and proximity to vital functional centers, often requiring surgical intervention[4,6].

According to the Global Cancer Observatory (GLOBOCAN) 2022, there were 321,731 brain tumor cases worldwide (1.72% of all cancer cases)[7], while the Central Brain Tumor Registry of the United States (CBTRUS) reported an incidence rate of 25.34

per 100,000 population, with a higher prevalence in females.[8] In Indonesia, brain tumors ranked 15th out of 32 most common cancers, with a mortality rate reaching 91.6% in 2022, highlighting the poor prognosis and urgent need for early detection and intervention[5].

Although several studies in Indonesia have described the characteristics of brain tumor patients in various referral hospitals, the data remain regional and do not represent the entire country. A study at RSUP Prof. Dr. I.G.N.G. Ngoerah Bali found a predominance of cases in males aged 51-60 years, with high-grade gliomas being the most common type[9]. In contrast, RSUP Dr. Cipto Mangunkusumo Jakarta reported astrocytomas, medulloblastomas, and gliomas as the most frequent tumors[10]. Another study at RSUP Dr. Kariadi Semarang identified the frontal lobe as the most common tumor location[11], while RSUP Hasan Sadikin Bandung recorded the highest incidence among children aged 6-12 years[12]. However, no specific data are currently available regarding the characteristics of brain tumor patients in Ambon City, including age distribution, sex, clinical symptoms, and classification by tumor location and type. This lack of data represents a research gap that could hinder evidence-based healthcare planning and policy formulation.

The absence of epidemiological and clinical data on brain tumor patients in Ambon City necessitates a hospital-based study at the main referral center in eastern Indonesia. RSUP Dr. J. Leimena, as a national referral hospital in Maluku, plays a strategic role in managing neurosurgical cases, including brain tumors[13]. The hospital is also in the process of developing the first radiotherapy service in Maluku Province, making this research highly relevant to improving healthcare quality[14]. The novelty of this study lies in mapping the characteristics of brain tumor patients at RSUP Dr. J. Leimena based on age, sex, clinical symptoms, tumor location by brain lobe, and radiological classification into intra-axial and extra-axial types—data that have never been reported before in this region.

The research question of this study is: What are the characteristics of brain tumor patients at RSUP Dr. J. Leimena between 2021 and 2024 in terms of age, sex, clinical symptoms, anatomical localization of the tumor, and radiological classification (intra-axial vs. extra-axial)? The objective of this study is to comprehensively describe the profile of brain tumor patients at RSUP Dr. J. Leimena, providing an epidemiological and clinical database to support more effective patient management.

The findings of this study are expected to make contribute to the academic literature, particularly by enriching knowledge on the epidemiology and clinical characteristics of brain tumors in eastern Indonesia. They may also serve as a foundation for healthcare policy-making, resource allocation, and the enhancement of referral systems and early detection programs in Maluku. Practically, the data may help optimize radiology and neurosurgical services at RSUP Dr. J. Leimena and serve as a reference for further research on risk factors, progression patterns, and clinical outcomes of brain tumor patients in eastern Indonesia.

Materials and Methods

Study Design

This study employed a quantitative descriptive design with a cross-sectional approach to describe the characteristics of brain tumor patients at Dr. J. Leimena Central General Hospital between 2021 and 2024. Data were obtained from hospital medical records and encompassed patient demographic variables (age and sex), clinical presentations, tumor classification based on location relative to the

brain parenchyma (intra-axial or extra-axial), and anatomical localization of the tumor.

Sample

The study population consisted of patients diagnosed with brain tumors at Dr. J. Leimena Central General Hospital between 2021 and 2024. The research sample was selected using the total sampling method, in which all members of the population meeting the study criteria were included as samples. The inclusion criteria were patients diagnosed with brain tumors at Dr. J. Leimena Central General Hospital in 2021-2024, while the exclusion criteria were patients with incomplete medical records. The sample size was determined based on the total number of patients who met the study criteria during the 2021-2024 period, resulting in 61 participants.

Data Collection Technique

The data in this study were secondary data obtained from the medical records of brain tumor patients during the study period. The data collected included patient demographic characteristics (age and sex), clinical presentations, tumor classification based on location relative to the brain parenchyma (intra-axial or extra-axial), and anatomical localization of the tumor.

Data Analysis Technique

The data were analyzed using descriptive statistical analysis with the assistance of the Statistical Package for the Social Sciences (SPSS) software to determine the distribution of patient characteristics, including age, gender, clinical symptoms, tumor type, and tumor location.

Ethical Consideration

This study received approval from the Ethics Committee of the Faculty of Medicine, Universitas Pattimura (Approval No. 142/FK-KOM.ETIK/VII/2025) and from RSUP Dr. J. Leimena Ambon (Permit No. PP.06.02/D/XXXIII/2755/2025).

Results

The results of this study present an overview of the characteristics of brain tumor patients at RSUP Dr. J. Leimena from 2021-2024. The analysis includes the distribution of patients based on age, gender, clinical symptoms, tumor type, and tumor location.

Table 1. Distribution of Brain Tumor Patients at RSUP Dr. J. Leimena, 2021–2024

Variable	Category	Frequency (n)	Percentage (%)
Age (year)	0-5	0	0
	6-11	0	0
	12-16	2	3,3
	17-25	1	1,6
	26-35	4	6,6
	36-45	9	14,8
	46-55	18	29,5
	56-65	22	36,1
	>65	5	8,2
Sex	Men	22	36,1
	Women	39	63,9

Variable	Category	Frequency (n)	Percentage (%)
Clinical symptoms	Headache	20	32,8
	Vomiting	3	4,9
	Seizures	7	11,5
	Visual disturbances	8	13,1
	Decreased consciousness	1	1,6
	Hemiparesis	6	9,8
	Cognitive dysfunction	3	4,9
	>1 clinical symptoms	13	21,3
Tumor types	Intra-axial	30	492
	Extra-axial	31	50,8
Tumor locations	Frontal lobe	24	39,3
	Parietal lobe	16	26,2
	Temporal lobe	4	6,6
	Occipital lobe	6	9,8
	Cerebellum	3	4,9
	Brainstem	2	3,3
	Sellar region	2	3,3
	Cerebellopontine angle	3	4,9
	Olfactory groove	1	1,6
Total		61	100

Source: Medical Record Data of Brain Tumor Patients at RSUP Dr. J. Leimena, 2021–2024.

This study involved 61 brain tumor patients at RSUP Dr. J. Leimena during the period 2021-2024. The larges age group was 56-65 years, with 22 patients (36.1%), followed by 46-55 years with 18 patients (29.5%), 36-45 years with 9 patients (14.8%), >65 years with 5 patients (8.2%), and 26-35 years with 4 patients (6.6%). No cases were identified in the 0-5 years and 6-11 years groups. The lowest proportions were observed in the 12-16 years and 17-25 years groups, with 2 patients (3.3%) and 1 patient (1.6%), respectively. With respect to sex, females predominanted with 39 patients (63.9%), compared to 22 males (36,1%). Headache was the most frequently reported clinical symptom, observed in 20 patients (32.8%). Multiple complaints were reported in 13 patients (21.3%), followed by visual disturbances (8 patients, 13.1%), seizures (7 patients, 11.5%), hemiparesis (6 patients, 9.8%), vomiting (3 patients, 4.9%), cognitive dysfunction (3 patients, 4.9%), and decreased consciousness (1 patient, 1.6%). Tumor types were relatively balanced, with intra-axial tumors accounting for 30 patients (49.2%) and extra-axial tumors for 31 patients (50.8%). The frontal lobe was the most frequent anatomical location (24 patients, 39.3%), followed by the parietal lobe (16 patients, 26.2%), temporal lobe (6 patients, 9.8%), sellar region (4 patients, 6.6%), cerebellum and occipital lobe (3 patients each, 4.9%), brainstem and cerebellopontine angle (2 patients each, 3.3%), and olfactory groove (1 patient, 1.6%).

Table 2. Average Score of Age Variable

Variable	Mean	Min - Max
Age (years)	51,74	13 - 73

Source: *Data Primer 2025*

Based on Table 2, the mean age of patients was 51.74 years, tanging from 13 to 73 years.

Discussion

Age Characteristics

This study showswed that the 56–65 years age group was the most affected by brain tumors. The mean age of the patients was 51.74 years, with the youngest being 13 years old and the oldest 73 years old. These findings indicate that although brain tumors can occur in adolescents, the majority of cases are found in late adulthood to older populations, while the incidence in younger age groups was relatively low, with no cases observed in children.

This pattern is consistent with the study by Safedin et al. (2022) and Neamtu et al. (2013), which reported the highest incidence in the ≥50 and 55–65 age groups[15,16], as well as the study by Ahmad et al. (2024), which found the highest occurrence in the 51–60 years age group[9]. The higher incidence in older age groups is likely related to immunosenescence, defined as the decline in immune system function with age[17]. In addition, cumulative exposure to environmental risk factors throughout life, such as radiation, carcinogenic substances, and oxidative stress, can trigger the transformation of cells into neoplastic cells. The low incidence in younger age groups may be due to shorter exposure time[18].

Sex Characteristics

With respect to sex, this study found that females were more likely to develop brain tumors compared to males. One suspected contributing factor is hormonal influence, particularly estrogen[18]. This finding is consistent with the study by Dewi et al. (2021) and, which reported that females are more frequently affected by both primary and metastatic brain tumors[19]. Another consistent finding by Talawo et al. (2023) and Mutmainnah et al. (2024) found that meningioma, as a primary brain tumor, is more commonly found in women[20,21]. However, this is not in line with Fardillah et al. (2023), who found that another primary brain tumor, astrocytoma, is more commonly reported in men[22].

Hormonal factors are not the only cause, as age also plays a significant role. In this study, females most commonly developed brain tumors between the ages of 46 and 55, whereas males were most affected between 56 and 65 years. Advancing age leads to the aging of the immune system, or immunosenescence, a condition in which the body loses its ability to recognize and eliminate abnormal cells[17]. This facilitates genetic mutations and uncontrolled cell growth. In addition, cumulative exposure to environmental factors throughout life may increase the risk of tumor development[18].

Clinical Symptom Characteristiscs

The most frequently observed clinical symptom in this study was headache, with the highest proportion found in middle-aged women (46-55 years). The primary mechanism underlying headache in brain tumor patients is increased intracranial pressure (ICP), caused by tumor mass growth within the limited space of the cranial cavity. Any increase in intracranial volume whether from the tumor itself, cerebral edema, increased blood volume, or cerebrospinal fluid (CSF) circulation disturbances can elevate ICP and stimulate pain-sensitive structures such as the dura mater and intracranial blood vessels. Headaches are generally progressive, more severe in the morning, and worsen during activities that increase ICP, such as coughing or straining[18,23]. Some patients also reported a combination of headache with other neurological symptoms, including visual disturbances, motor weakness, seizures, decreased consciousness, cognitive impairment, or projectile vomiting. This combination of symptoms reflects the mass

effect of the tumor compressing or disrupting brain structures according to the tumor's location. These findings are consistent with studies by Ardhini et al. (2019) and Sembiring et al. (2025), which reported that headache is the dominant clinical manifestation of both primary and metastatic brain tumors and is often accompanied by neurological deficits[12,24].

Tumor Type Characteristiscs

This study found an almost equal distribution of extra-axial tumors (50.8%) and intra-axial tumors (49.2%), with no significant differences based on sexes. Extra-axial tumors are generally easier to detect because of their superficial location, well-defined lesion boundaries on imaging, and slower growth, as typically observed in meningiomas[25,26]. However, the nearly equal proportion of intra-axial tumors indicates that both types still have a high likelihood of clinical detection. CBTRUS data show that meningiomas (extra-axial tumors) account for 36.6% of all central nervous system (CNS) tumors, while glioblastomas (intra-axial) make up about 14.9%, with gliomas overall approaching 30%. This indicates that meningiomas have a higher rate of incidental detection compared to gliomas, yet the overall proportion of gliomas remains significant[27].

Tumor Location Characteristiscs

This study found that the frontal lobe was the most common location of brain tumors among the patients studied. Anatomically, the frontal lobe has extensive cortical coverage and is involved in motor and cognitive functions, as well as connections with visual centers[28]. This makes the region more susceptible to tumor growth and contributes to a variety of neurological symptoms. These findings are consistent with studies by Bisri et al. (2015) and Ardhini et al. (2019), which reported the frontal lobe as the most common site of brain tumors[12,29]. However, these results differ from the report by Wahyuhadi et al. (2021), which found the most frequent location to be the meninges, which may be attributable to differences in radiological interpretation or medical record documentation[30].

Conclusion

Most brain tumor patients at RSUP Dr. J. Leimena (2021–2024) were between 56 and 65 years of age and predominantly female. Headache was the most common presenting symptom, frequently accompanied by visual disturbances, seizures, or hemiparesis. Tumors were almost equally distributed between extra-axial and intra-axial types, with the frontal lobe being the most common location. These findings underscore the importance of early detection and comprehensive imaging, particularly in older adults and patients presenting with non-specific neurological symptoms.

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