

# Demographic Study of Brain Tumour in a District Hospital of Sibul, Sarawak

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## Abstract

**Introduction:** According to World Health Organisation's Globocan 2012 database, brain tumours accounts for about 2% of all cancers in Malaysia. It was ranked as 11th and 13th most common cancer among males and females, respectively. This debilitating disease can cause a tremendous burden to patients and their families and healthcare services. The main objective of this study was to provide demographic data on the type of brain tumours and the distribution of age and gender of the brain tumour cases presented to our neurosurgical department of Sibul Hospital, Sarawak, in 2020.

**Methods:** This is a retrospective study of the incidence and pattern of brain tumours admitted to the Neurosurgery Department in Sibul Hospital. Data was emanated from the 2020 brain tumour registry census. Of all the cases, only cases with confirmed histopathological results were included. Inoperable brain tumours that were diagnosed through radiological investigations were excluded.

**Results:** There were a total of 47 patients with brain tumours included in this study. Males constituted 38% (n=18) of the cases whereas 62% (n=29) of them were. The brain tumour was the least common in the paediatric group (0 to 10 years old) with only 2% (n=1). The incidence of brain tumours increased with age and reached its peak in the age group of 51-60 years (26%). The commonest type of brain tumour was meningioma (47%), followed by a metastatic brain tumour (21%) and glioma (12%). Meningothelial WHO grade I was the most common variant that accounted for 67% (n=15) of all meningioma. Lung carcinoma was found to be the most common primary, accounting for more than half (60%) of the metastatic brain tumours, followed by breast cancer (20%), thyroid cancer (10%) and malignant melanoma (10%). The crude incidence of the brain tumour in Sibul was 4.07 per 100,000 population/year.

**Conclusion:** This study has shown that the commonest brain tumour in central Sarawak was meningioma, followed by metastatic brain tumour and glioma. Meningothelial is the most frequent subtype of meningioma, whereas lung carcinoma was the commonest primary in brain metastases. The peak age group was 51-60 years old, and females showed a higher incidence than males. This study provides a baseline profile of the brain tumour's spectrum in central Sarawak. More data should be collected to aid in future research and healthcare planning.

## Keywords:

Brain tumour; Meningioma; Histopathological; Malignant melanoma; Neurosurgery

## Abbreviations

SGH: Sarawak General Hospital; MNCRR: Malaysian National Cancer Registry Report; CBTRUS: Central Brain Tumor Registry of the United State

## Introduction

Brain tumours are relatively less common compared to other tumours in Malaysia. According to World Health Organisation's Globocan 2012 database, brain tumours accounts for about 2% of all cancers in Malaysia. The Malaysian National Cancer Registry Report (MNCRR) from 2012-2016 has ranked brain tumours as 14th and 15th most common cancer among males and females respectively. Thus, brain tumours are given less focus compared to other tumours although it can be the most vivid form of human diseases promptly fatality. This debilitating disease can cause a tremendous burden to the patients, their families, and healthcare services. Despite a few studies done in East Coast Malaysia (2017) and Terengganu (2020), there was a limited data on brain tumours trend in a rural setting.

Sarawak is the largest among the 13 states in Malaysia. It has a population of 2.8 million across 124,450 km<sup>2</sup>. Sarawak General Hospital (SGH) was the sole referral centre of neurosurgery in Sarawak since 1988. However, many regions in Sarawak have diminished access to neurosurgery services due to its unique geographical challenges. For example, it takes about 15 hours to travel 900 km from the furthest hospital in Limbang to SGH. The long travel distances and time have markedly affected the outcome of the neurosurgical patient. Thus, to provide timely and immediate treatment, neurosurgical service was established in a district hospital in Sibul in 2013. The strategic location at the central zone has bridged the communications and triage across vast distances in rural locales. It is catered for the population of 1,153,000, from subdivisions of Sibul, Betong, Sarikei, Kapit, Mukah and Bintulu [1-4].

## Methodology

The primary purpose of this study was to provide a demographic data on the type of brain tumours and its distribution of age and gender in the neurosurgical department of a district hospital. From these data, comparison can be made not only to the other tertiary centre, but also its own referral centre in Sarawak General Hospital (SGH).

This is a retrospective study of the incidence and pattern of brain tumours admitted to the Neurosurgery Department in Sibu Hospital. Data was emanated from the 2020 brain tumour registry census. The information includes the incidence, age, and sex groups of brain tumour cases. Of all the cases, only cases with confirmed histopathological results were included. However, the grading of brain tumours is not included in data collection for this study. Besides, inoperable brain tumours that were diagnosed through radiological investigations were also not included.

## Results

There were a total of 47 patients with brain tumours included in this study. Males constituted 38% (n=18) of the cases whereas 62% (n=29) of them were female. The brain tumour was the least common in the paediatric group (0 to 10 years old) with only 2% (n=1). The incidence of brain tumours increased with age and reached its peak in the age group of 51-60 years (26%). The commonest type of brain tumour was meningioma (47%), followed by a metastatic brain tumour (21%) and glioma (12%). Meningothelial WHO grade I was the most common variant that accounted for 67% (n=15) of all meningioma. This was followed by clear cell meningioma (9%), psammomatous (9%), atypical (5%), microcystic (5%) and chordoid (5%). Lung carcinoma was found to be the most common primary, accounting for more than half (60%) of the metastatic brain tumours, followed by breast cancer (20%), thyroid cancer (10%) and malignant melanoma (10%). The crude incidence of the brain tumour in Sibu was 4.07 per 100,000 population/year in **Table 1**.

Variables	Number	Frequency
Gender		
Male	18	38%
Female	29	62%
Age group		
01-Oct	1	2%
Nov-20	2	4%
21-30	6	13%
31-40	6	13%
41-50	8	17%
51-60	12	26%
61-70	10	21%
>70	2	4%
Types of tumour		

Glioma	5	11%
Meningioma	22	48%
Meningothelial	15 (67%)	
Clear cell	2 (9%)	
Psammomatous	2 (9%)	
Atypical	1 (5%)	
Microcystic	1 (5%)	
Chordoid	1 (5%)	
Schwannoma	3	6%
Lymphoma	2	4%
Pituitary tumour	1	2%
Metastases	10	21%
Lungs	6 (60%)	
Breast	2 (20%)	
Thyroid	1 (10%)	
Skin	1 (10%)	
Germ cell tumour	1	2%
Others	3	6%
Crude incidence rate per 100,000	4.07	

**Table 1:** Age wise distribution of cases.

## Discussion

This retrospective study of the epidemiology of brain tumours was carried out at Sibu Hospital. Sibu Neurosurgery Department was the first district neurosurgery service established in 2013. Prior to this, all the neurosurgery cases were referred to SGH in Kuching. However, there has been limited data on brain tumours collected since the establishment. Thus, this study was conducted specifically to provide comprehensive demographic data on brain tumours in rural settings. This is essential to ascertain the estimation of the local disease burden.

The incidence of brain tumours worldwide ranged from 0.7-7.6 per 100,000 population/year. It was reported the highest in Asia (52.26%), followed by Europe (21.8%) [5]. MNCR (2012 to 2016) has reported that the incidence of brain tumours in Malaysia was 1.26 per 100,000 population/year. It was significantly lower than the incidence reported in Terengganu (5.77 per 100,000 population/year in 2018) and Sarawak itself in 2012 (5.1 per 100,000 population/year). The increasing trend of brain cancer is multifactorial. It could be attributed to the recent surge of environmental pollutants, occupational exposures and industrial radioactive sources. However, it can also be explained with the accessibility of the more advanced facilities to diagnose the disease [6,7]. The recent availability of computed tomography imaging and magnetic resonance imaging has significantly resulted in higher detection rates of brain tumours. Many of these were previously prematurely diagnosed as

strokes without diagnostic radio imaging [8]. For example, CT scan machines were only available in SGH and Sibu Hospital in the public sector of whole Sarawak before the year 2009. The long waiting list and troublesome travelling had averted any potential brain tumour cases, especially in the remote areas. However, a detailed study of the potential risk factors of brain tumours is not included in this study.

The incidence of brain tumours is closely related to age. Most brain tumours are being diagnosed in adults, with the highest incidences in patients aged 51 to 60 years (26%). These findings were consistent with Terengganu and Sarawak itself. However, the incidence rate of brain tumours in a developed country such as the United Kingdom was reported highest in patients more than 65 years old. This disparity could be due to the under-diagnosed of the elderly in Malaysia. Many of them had opted for conservative management instead of surgery due to frailty, multiple comorbidities, polypharmacy, and poor social support. Thus, no histopathological confirmation can be obtained even after the imaging has been done. Nevertheless, this finding should alert the need of improving the management of brain tumours in the elderly.

In the study, the incidence rate of brain tumours was higher in females compared to males. The result is consistent with the other epidemiology studies on brain tumours done in the United States (CBTRUS Statistical Report in 2019) and Malaysia. However, Yusoff et al. has reported that males were more preponderant to brain tumours overall in Kelantan except for meningioma and nerve sheath tumour. The likely explanation could be that meningioma, which occurred more frequently in females, was the most common brain tumour in our study. It accounted for 48% of all brain tumours. This result was higher than the studies done at Sarawak in 2002 and 2014 with 35% and 36%, respectively. On the other hand, the incidence rate of meningioma in the US was reported as 38.3% [9] the mismatch could be related to a higher operation rate on the relatively "benign" meningioma. Other complicated brain tumours were sent over to tertiary centres like SGH instead of performed under the rural setting in Sibu. Thus, glioma, which had been reported as the most typical brain tumours that sharply increased worldwide, was ranked as the third commonest brain tumour in this study.

Brain metastases were the second commonest brain tumours in the study. This was not surprising as Goh et al. had already established a rising trend of metastatic brain tumours in Sarawak from 2009 to 2012. This increasing trend was multifactorial such as the recent advanced in therapeutic oncology, which resulted in higher survival rate, the availability of better immunohistochemical staining to diagnose the primary sources and the earlier screening programs. However, the exact number of brain metastases was still vastly underestimated. In general, brain metastases are associated with poor prognosis even after surgical resection, chemotherapy or radiotherapy. It reflected the advanced stage of disease whereby the palliation was the usual direction of care. They were less likely to be subjected to aggressive surgery or biopsy. Lung cancer was the commonest primary source of brain metastases (60%) in our study, followed by breast, thyroid and skin cancer. These findings

were congruous with Goh et al. [3]. The percentage of lung primary was reported as high as 80% in all brain tumours. The study on the prevalence of brain metastases in the local setting is vital. It reflects the detection rate of the primary tumours and their control. The progression of disease into brain metastases causes a significant burden on the public health system and the caretakers [10,11].

## Conclusion

Meningioma was the commonest brain tumour in Sibu Hospital, followed by metastatic brain tumour and glioma. Meningiothelial is the most frequent subtype of meningioma, whereas lung carcinoma was the commonest primary in brain metastases. The peak age group was 51-60 years old, and females showed a higher incidence than males. This study has shown that there is no significant difference in brain tumour epidemiology in the rural setting. It provides a baseline profile of the brain tumour's spectrum in central Sarawak.

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