

# Epidemiological profile of patients with malignant Brain tumors in Rio Grande do Sul state - Brazil

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## Abstract

To determine the epidemiological profile of patients diagnosed with primary malignant brain tumors in the state of Rio Grande do Sul/RS, Brazil, from 2013 to 2019. This is a descriptive, retrospective study with a quantitative approach, carried out through analysis of secondary data collected at the Information Technology Department of the Unified Health System (DATASUS). One thousand five hundred and fifty-eight cases of malignant primary brain tumor were diagnosed. The highest prevalence of cases occurred among men (55.78%) and among individuals aged 40 to 59 years (28.34%). The macro-region with the highest incidence was the Metropolitan (45.64%). An expansion of the database is necessary, mainly in some pathological characteristics such as location of the neoplasm, histological type and morbidity and mortality and patient characteristics such as race to better predict risk factors, prevention and diagnosis.

**Keywords:** Oncology; Brain Neoplasm; Malignant Neoplasm; Epidemiology.

## Introduction

Primary neoplasms of the central nervous system, despite being considered rare, with an incidence of 3.4 cases per 100,000 inhabitants in the

world, have a very high mortality. It is estimated that in 2012 alone, about 189,400 people died from primary brain tumors worldwide [1]. Even so, there is a lack of information in this area, making constant analysis of epide-

miological data necessary to better understand the patterns of the disease.

In Brazil for the year 2020, 11,100 new cases were estimated, the majority in male patients. Rio Grande do Sul is the state with the fourth highest incidence of malignant brain neoplasms, reaching an incidence of 6.85 cases per 100 thousand inhabitants for men, and 4.79 cases per 100 thousand inhabitants for women [2].

Although rare, primary brain tumors have very low survival rates, reaching 6% 5-year survival in the case of Glioblastomas [3-4]. Even so, there is still a great scarcity of studies that analyze this type of tumor, as already evidenced in meta-analysis previously [4-6].

Given the importance and need for an epidemiological analysis of the disease and the high incidence in Rio Grande do Sul, the present study aims to trace the epidemiological profile of primary malignant brain neoplasms from January 2013 to December 2019.

## Methodology

The present study is a descriptive, retrospective, longitudinal and quantitative research design. Data collection was carried out through the Department of Informatics of the SUS (DATASUS), with data referring to the period from January 2013 to December 2019.

All patients registered in the DATASUS database diagnosed with primary malignant brain neoplasm in Rio Grande do Sul, from January 2013 to December 2019, were included in the study. Patients who did not meet these requirements were excluded from the analysis.

Since the data and variables collected are in the public domain and available online on the DATASUS platform, this research is free from ethical risks, as there was no direct involvement of any individual.

## Results

In the period from 2013 to 2019, 1558 primary malignant brain neoplasms were diagnosed in Rio Grande do Sul, most of them from the Metropolitan macro-region (45.64%) with 711 cases, followed by the North (17.78%) with 277 cases, Missioneira (12.97%) with 202 cases, Serra (11.81%) with 184 cases, Midwest (4.62%) with 72 cases, South (4.36%) with 68 cases and Vales (2, 82%) with 44 cases (Table 1 and Figure 1).

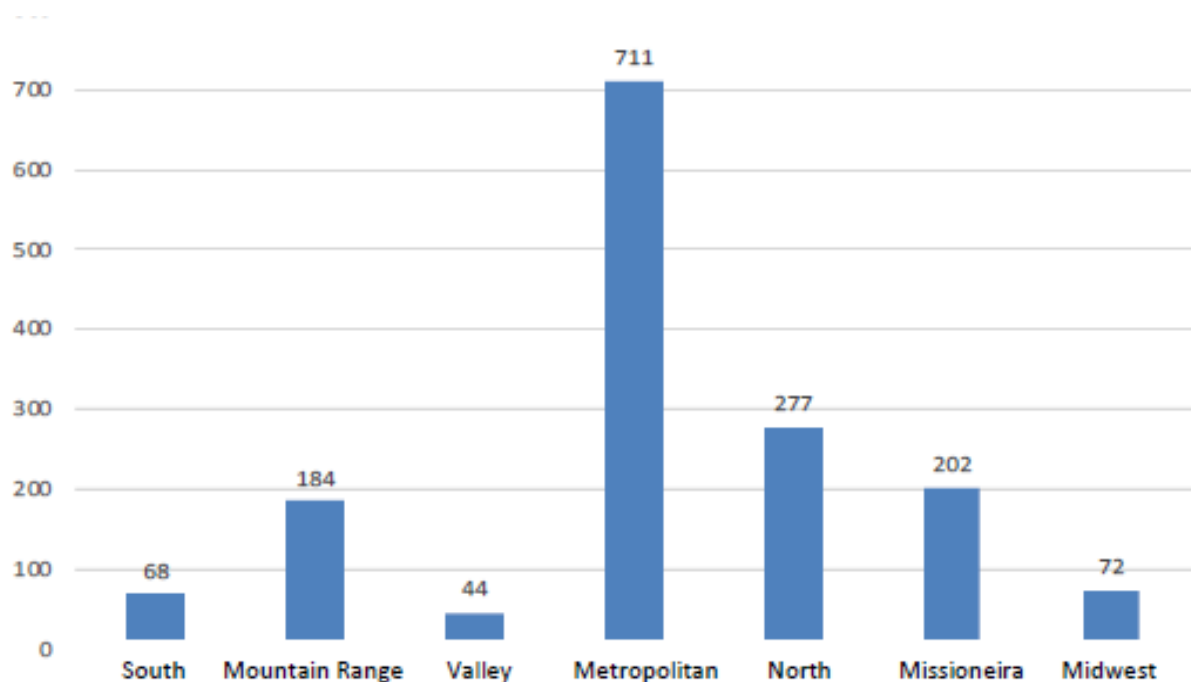
The cities with the highest number of cases are Porto Alegre city in Metropolitan region (41,2%), followed by Passo Fundo City in North region (16,69%), Ijuí City in Missioneira region (8,60%), Caxias do Sul city (6,16%) and Bento Gonçalves city (5,65%) both in Mountain Range region (Table 2). Total

cases were 1558, were 869 cases in men (44.2%) (Figure 2). (55.78%) and 689 cases in women

**Table 1:** Distribution of Malignant Brain Tumors Cases by Region.

Region	C71 - Malignant		Population	Percentage	Percent
	Brain Tumors	Percentage		Population	Difference
RS	1.558	100,00%	4.906.655	100,00%	0,00%
South	68	4,36%	642.297	13,09%	8,73%
Mountain Range	184	11,81%	542.842	11,06%	0,75%
Valley	44	2,82%	304.265	6,20%	3,38%
Metropolitan	711	45,64%	2.480.232	50,55%	4,91%
North	277	17,78%	340.230	6,93%	10,85%
Missioneira	202	12,97%	210.323	4,29%	8,68%
Midwest	72	4,62%	386.466	7,88%	3,26%

**Figure 1:** Distribution of diagnosed cases of primary malignant brain tumors in Rio Grande do Sul from 2013 to 2019 by age group.

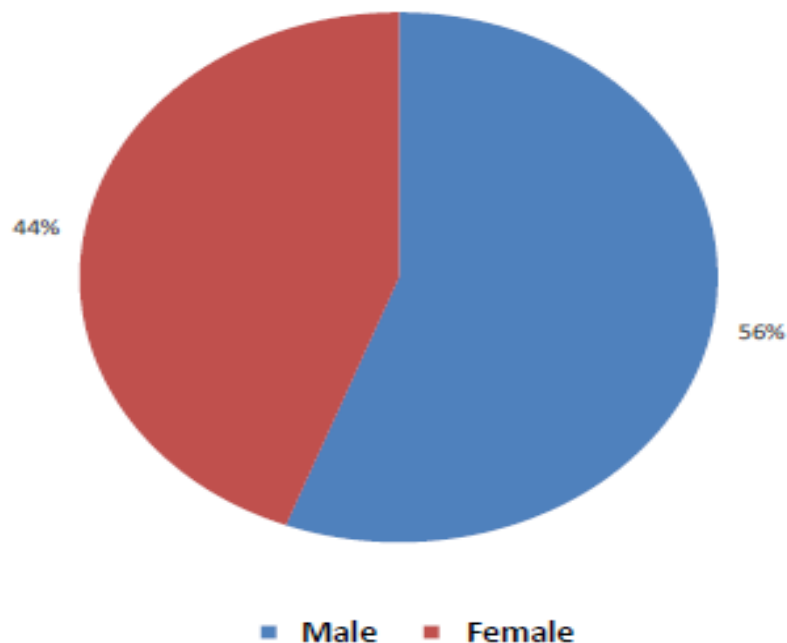


**Table 2:** Distribution of Malignant Brain Tumors Cases by City.

City	Region	C71 - Malignant Brain Tumors	Percentage	Population	Percentage Population	Percent Difference
<b>Total</b>	<b>RS</b>	1.558	100,00%	4906655	100,00%	0,00%
Bage	South	2	0,13%	116794	2,38%	2,25%
Bento Gonçalves	Mountain Range	88	5,65%	107278	2,19%	3,46%
Cachoeira do Sul	Valley	3	0,19%	83827	1,71%	1,52%
Canoas	Metropolitan	6	0,39%	323827	6,60%	6,21%
Carazinho	North	7	0,45%	59317	1,21%	0,76%
Caxias do Sul	Mountain Range	96	6,16%	435564	8,88%	2,72%
Cruz Alta	Missioneira	12	0,77%	62821	1,28%	0,51%
Erechim	North	10	0,64%	96087	1,96%	1,32%
Estrela	Valley	1	0,06%	30619	0,62%	0,56%
Ijuí	Missioneira	134	8,60%	78915	1,61%	6,99%
Lajeado	Valley	28	1,80%	71445	1,46%	0,34%
Novo Hamburgo	Metropolitan	7	0,45%	238940	4,87%	4,42%
Passo Fundo	North	260	16,69%	184826	3,77%	12,92%
Pelotas	South	50	3,21%	328275	6,69%	3,48%
Porto Alegre	Metropolitan	645	41,40%	1409351	28,72%	12,68%
Rio Grande	South	16	1,03%	197228	4,02%	2,99%
Santa Cruz do Sul	Valley	12	0,77%	118374	2,41%	1,64%
Santa Maria	Midwest	39	2,50%	261031	5,32%	2,82%
Santa Rosa	Missioneira	56	3,59%	68587	1,40%	2,20%

Sao Leopoldo	Metropolitan	51	3,27%	214087	4,36%	1,09%
Taquara	Metropolitan	1	0,06%	54643	1,11%	1,05%
Uruguaiana	Midwest	33	2,12%	125435	2,56%	0,44%
Viamao	Metropolitan	1	0,06%	239384	4,88%	4,81%

**Figura 2.** Distribution of diagnosed cases of primary malignant brain tumors in Rio Grande do Sul from 2013 to 2019 by sex.



The age group most affected with brain tumors was from 0 to 19 years old (259 cases) maintaining an ascending distribution from the age group from 20 to 24 years old (43 cases) until the peak in the range of 55 to 59 years old (191 cases) decreasing then until the 80 years and over (19 cases) (Figure 3).

## Discussion and Conclusion

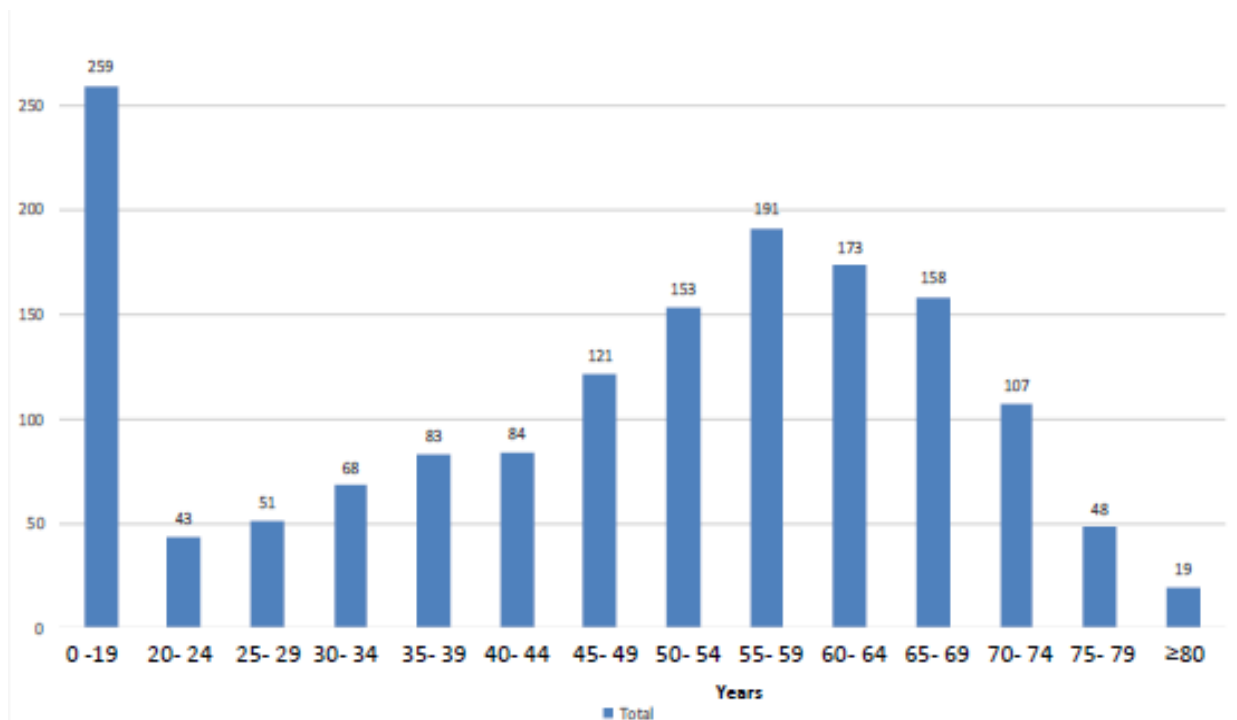
Gliomas represent the vast majority of primary malignant tumors of the central nervous system, and most of its subtypes affect men more because of the oncogenic mechanisms of these subtypes. Four subtypes of Glioblastoma are currently known [7-8].

The Mesenchymal subtype, which is engineered by the function of neurofibromin (NF1), PTEN and TP53, has the greatest disparity between the

different types of sexes [8]. Yet subtype C, which is a human transformation of the EGFR gene, is equivalent in both men to the *EGFR* gene, it is equivalent in both women [8]. There is still a need

for greater knowledge of the patterns of oncogenic mechanisms to elucidate the reason for the difference [7-8].

**Figure 3:** List of diagnosed of primary malignant brain tumors stratified by age distributed in the health macro-regions of Rio Grande do Sul from January 2013 to December 2019.



The age group most affected in this study is from 0 to 19 years old, with 259 registered cases, followed by 55 to 59 years old, with 191 cases. However, the childhood age group is grouped in 20 years while the rest is grouped in 5 years. Therefore, for a correct evaluation of the data, it is necessary to group everything every 20 years. Thus, the most affected age group is actually from 40 to 59 years old. This data is consistent with what was observed in previous

studies both in Brazil and in the United States [4,7,9].

According to the analysis of this study, the cases of diagnoses were performed in the Metropolitan region, representing 45 cases, 44% of all reported cases, followed by the northern region. Although the vast majority of cases were found in the metropolitan region, it is also important to note that the majority of the population of Rio Grande do Sul resides in this region

(50.55%). Therefore, when comparing the number of cases with the number of inhabitants, the region with the highest number of cases becomes the North, followed by Missioneira and then Metropolitan. These regions as cities had the highest number of cases in Passo Fundo (260 cases), Ijuí (134 cases) and Porto Alegre (645 cases).

This distribution was based on the extent of the neoplasm. The diagnosis of neoplasms is primarily based on the brain performed by means of stereo biopsies with lesion surgeries or surgeries performed in the case of surgically performed malignant retraction [10-12]. This requires a highly complex center, trained staff and nearby pathology laboratories. This structure is more commonly found in large medical centers that receive patients from neighboring cities for this surgery, such as Porto Alegre city and Passo Fundo city [13]. Thus, the analysis has been more necessary and in view of the need to have more possibility to draw an epidemiological profile, making it clear the expansion of data to cure the profile of the patients studied.

With the analysis performed, it was possible to understand that men aged between 40 and 59 years were the patients most affected by primary malignant neoplasms of the brain, which is consistent with previous

reports from other regions of Brazil and the United States.

The distribution of the location of the diagnoses was concentrated in the cities that have the largest hospital structure. It is also necessary to expand the information on individuals such as race, tumor, histological type and morbidity and mortality in order not to determine neoplasms and to be able to predict risk factors, preventive measures, and prognosis more accurately.

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