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Hospital morbidity and mortality from epilepsy in a large latin american country

Summary

Objective: This study aimed to study the epidemiological profile of hospital morbidity and mortality from epilepsy in Brazil from 2017 to 2021.

Methods: An epidemiological time series study of the Ecological descriptive type was carried out with data coming from the SUS Information System. The data were expressed through graphs and tables and presented in absolute numbers and frequencies and also exposing the descriptive statistics, mean standard deviation and coefficient of variation. As this is a study with secondary data from official and public databases, this work does not require approval by a research ethics committee.

Results: There were 263988 hospitalizations for epilepsy in Brazil, n=6484 deaths. The Southeast region had the highest prevalence with n=107416 hospitalizations, followed by the Northeast (n=64902) and South (n=55106). Most affected sex: male (58%). Race: more common in browns (39,33%) and whites (32,63%). Age groups with the most hospitalizations: 1 to 4 years (17%); 40-49 years and 50-59 years – 10% each. Hospitalization expenses: R$ 223443589,70.

Conclusion: Given these results that demonstrate a large number of hospitalizations and the presence of hospital deaths, it is hoped that these data will be used to support improvements in public health policies to improve the prevention, diagnosis and treatment of this disease, reducing sequelae and expenses, and, always as possible, avoiding deaths.

Keywords: epilepsy, epidemiology, morbimortality, brazil

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Introduction

Epilepsy, a term derived from the Greek that means "being taken by surprise", its etiology and the neurological processes involved in its manifestations were completely unknown until the end of the 19th century, when scientists opened the way for the study of neurons and their neuronal structure.[1]

Regarding the concept of epilepsy, it is notable that there was no complete satisfactory definition, in which the disease was considered to have a "supernatural nature", associated with evil spirits, in addition to brain disorders with suspected hereditary origin or even linked to witchcraft.[2] Today, this disease is characterized by a permanent predisposition of the brain to generate epileptic seizures (EC), in which there is a transient occurrence of signs or symptoms related to abnormal neuronal activity. These ECs can have cognitive, psychological, neurobiological and social consequences, being associated with increased risks of mortality, psychiatric comorbidities (especially depression and anxiety) and psychosocial.[3]

Throughout history, medical knowledge about this pathology helped reinforce the stigma associated with the disease. This situation has changed as new scientific discoveries on the subject emerge. Social exclusion was a striking feature, alongside structural exclusions, such as impediments to so-called violent sports, hygienic recommendations for family members, dietary restrictions and restrictions on drinking only water, justified by the crises that caused "social disorder" through physical disorder and thus highlighted the impotence of doctors at the time.[1] Therefore, familiarity, knowledge and abandonment of stigmas about epilepsy are extremely important, as they are the main vectors of health information in society. The dissemination of adequate information about this disease can reduce the myths that still exist today.[4]

Although there are already advances made in neuroscience, it is noted that epilepsy, a disease that affects people of different age groups, races or social classes, is still marked by negative ideas, which end up interfering with the understanding of the disease.[2] Believing that epilepsy is a contagious disease and that these patients have a severe psychiatric illness are some of the existing myths that generate prejudice, such as not employing someone with epilepsy or not having a relationship with someone who has seizures.[4]

The ILAE (International League Against Epilepsy) presents a revised scheme for the Classification of Epilepsies, with the purpose of working in conjunction with the classification of types of epileptic seizures. There are 3 diagnostic classifications: types of seizures, types of epilepsy and epileptic syndromes.[5] Among the types of seizures, we can mention generalized seizures, which begin with a generalized discharge and appear mainly in primary or idiopathic epilepsies. As an example of these crises, we have the absence crisis, in which there is a sudden suspension of consciousness, being able to resume reasoning afterwards and the tonic-clonic crisis, first losing consciousness and muscle tone, causing the patient to fall, and then the beginning of tremors, with contraction and stiffening of the extremities of the body.[6]

In simple partial seizures, which begin in a localized region of the cortex, the patient may experience different sensations, such as distortions of perception or uncontrolled movements of a part of the body. In addition, you may have sensitive, sensorial or psychic responses, such as the feeling of sudden fear, discomfort in your stomach or even seeing and hearing differently. If the patient loses

consciousness, the crisis will be called complex partial. After each episode, the person may feel confused and have memory deficits. There are also several other types of crises and, if they last more than 30 minutes without the person regaining consciousness, they are dangerous and can harm brain functions, thus requiring better analysis and professional monitoring.[6]

Anomaly in the behavior of the cerebral cortex, whose etiopathogenesis is an anomalous discharge of a group or all of the neurons of the cerebral cortex (epilepsy), is the most common chronic brain disease, affecting around 50 million people worldwide, almost 80% of whom live in low- and middle-income countries. It is estimated that 70% of people with epilepsy can become seizure-free if diagnosed and treated appropriately. However, around three-quarters of people with epilepsy in low-income countries do not receive the treatment they need.[7] The feared excessive and unnecessary mortality creates a need for urgent prevention in order to achieve greater control of epileptic seizures. Although there is adequate drug treatment, it is extremely important that patients are able to identify and avoid situations that may increase the existence of EC, such as sleep deprivation and the abusive use of alcoholic beverages.[3] Given this, the objective of this work was to study the profile of hospital morbidity and mortality in recent years, in order to estimate more precise epidemiological parameters on epilepsy in Brazil.

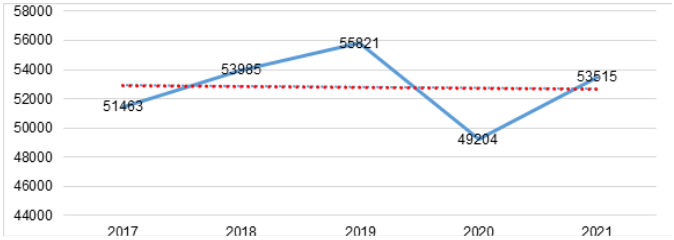
Methodology

Exploratory, descriptive, epidemiological, time series study, from January 2017 to December 2021, with secondary data from DATASUS - Ministry of Health, Brazil, on: Epilepsy. The total number of hospitalizations for epilepsy in Brazil was n=263988, a total found in the DATASUS System, during the period under study (2017-2021). The variables analyzed were: ICD-10 Morb List: Epilepsy, sex, age group, race, year of processing, Brazil by region, hospitalizations, days of hospitalization, amount spent, deaths.

Data collection was carried out through access to the DATASUS System, through the Ministry of Health's Tabnet-DATASUS, which is an official and public database, available online. The data were exported from DATASUS and tabulated in Excel, and later exported to the Bioestat 5.3 Program. The results were displayed in tables and graphs and presented in absolute numbers and percentages, with a study of their distribution frequency. With regard to ethical aspects, this research project does not require submission to the Ethics Committee corresponding to the region, since, respecting the ethical and legal aspects proposed by Resolution n° 466, of December 12, 2012, the opinion in cases of research with secondary data in a public database, such as the current proposed research.

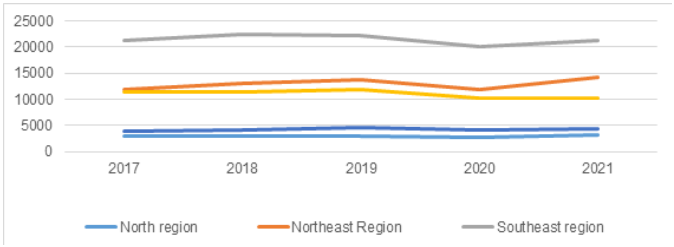
Results

There were n=263988 hospitalizations for epilepsy in Brazil in the period from 2017 to 2021, which resulted in an average=52797,60(±2537,70) and Coefficient of Variation (CV)=4,81% and demonstrated a downward trend in 2020 and a rising in the years 2018, 2019 and 2020, therefore, this growing trend was observed in almost the entire period, except in 2020, the year in which there was a considerable drop (Graph 1). When analyzing the distribution of hospitalizations for epilepsy in Brazil, by region/year (Graph 2), from 2017 to 2021, it was observed that the Southeast region had the highest number of hospitalizations for this disease, with a decrease only in 2020, followed by by the Northeast region, which followed the same distribution pattern, with a reduction in hospitalizations only in 2020, followed by the South region, which demonstrated a decreasing trend from 2019 onwards, followed by the Central-West and North regions.



Graph 1 Distribution of hospitalizations for epilepsy in Brazil, from 2017 to 2021.

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.



Graph 2 Distribution of hospitalizations for epilepsy in Brazil, by region/year, from 2017 to 2021.

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

Regarding hospitalizations for epilepsy in Brazil, such data showed, in the Southeast: n=107416, mean= 21483,20 (±903,14); CV=4,2%; Northeast: n=64902, mean= 12980,40(±1114,60), CV=8,59%; South: n=55106, mean=11021,20 (±754,42), CV=6,85%; Midwest: n=21472, mean=4294.4000 (±313,08), CV=7,29%; North: n=15092, mean=3018.40 (±191,79), CV=6,35%. In relation to the variables, sex, race and age group (Table 1), the most affected sex was male with 58% of hospitalizations, the most affected race was the brown race with 39,33%; followed by the white race with 32,63%; which was followed by the race without information with 22,39%.

Regarding the age group, hospitalizations for epilepsy occurred in all age groups, with higher percentages of hospitalizations in the age groups of 1 to 4 years old with 17%, 40 to 49 years old with 10%, 50 to 59 years old with 10% and 5 to 9 years old with 9% and the lowest percentages of hospitalizations for epilepsy occurred in the age group of 15 to 19 years old with 5% and 80 years old and over with 4%. It was observed that 41% of hospitalizations occurred in the age groups between <1 to 14 years old, 28% from 40 to 69 years old, 21% from 15 to 39 years old and 10% from 70 to 80 years old and over (Table 1).

The amount spent over the period, with these hospitalizations for epilepsy in Brazil, totaled R$223443589,70, which made an average n= 44688717,94 (±1,930,639.95); CV=4.32%. The Southeast Region had the highest amount spent in this period with n=r$108,511,813.80; followed by the South Region: n=r$46300620,03; Northeast: n=r$43942502,38; Midwest: n=r$16714024,12; North: n=r$7974629,38. The Southeast region showed an increasing trend in spending until 2020, a year in which there was a decline and new growth in 2021. The South region demonstrated a slight trend of decline in the amount spent from 2019 onwards. The Northeast region, however, demonstrated a growth trend of the amount spent from 2019 onwards, and the Central-West and North regions demonstrated some stability.

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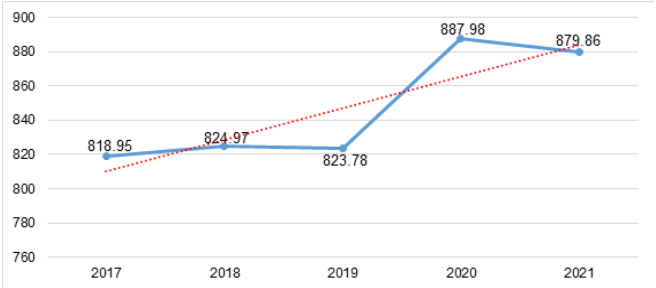
Table 1 Distribution of hospitalizations for epilepsy in Brazil, by sex, race/color and age group, from 2017 to 2021

Epilepsy	Hospitalization (N=263988)	
	Hospitalizations	%
Sex		
Masculine	152519	58,00
Feminine	111469	42,00
Race/color		
White	86135	32.63
Black	10644	4,03
Brown	103819	39,33
Yellow	3828	1,45
Indigenous	448	0.17
Ignored	59114	22,39
Age range		
Minor 1 year	20065	8,00
1 to 4 years	45208	17,00
5 to 9 years	25181	9,00
10 to 14 years old	17428	7,00
15 to 19 years old	12977	5,00
20 to 29 years old	21257	8,00
30 to 39 years old	22231	8,00
40 to 49 years old	25575	10,00
50 to 59 years old	26622	10,00
60 to 69 years old	21457	8,00
70 to 79 years old	15735	6,00
80 years and over	10252	4,00

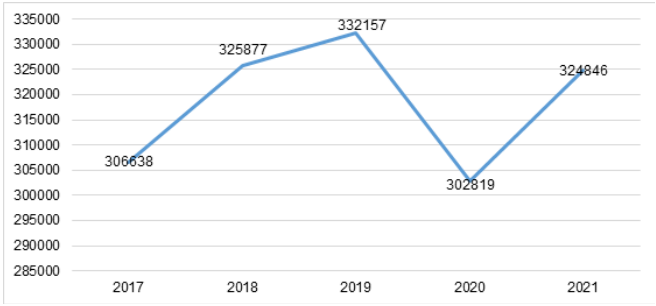
Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

The average value for hospitalizations (Graph 3), in the period from 2017 to 2021, was n=R$846,42, with an increasing trend in spending in the period and a large peak in the average value of spending in 2020 with n=R$887,98 and lower average expenditure in 2019 with n=r$823,78. The days spent in hospital due to epilepsy in Brazil from 2017 to 2021 (Graph 4) totaled n=1592337 days in this 5-year interval, with an upward trend until 2019, the year in which we had the biggest peak with n=333157 days, followed by a decrease in 2020, the year in which there was the lowest number of days of stay with n= 333157 days, and in 2021 a new upward trend is projected, which, however, was still below 2019. Regarding the average number of days spent in hospital due to epilepsy in Brazil, the Southeast had the highest average number of days spent in hospital with n=7,4 days; followed by the Northeast with n=5,6 days, then the Central-West with n=5,4, the North with n=5,1 and the South with n=4,3 days.



Graph 3 Distribution of the average amount spent on hospitalizations for epilepsy in Brazil, per year, from 2017 to 2021.

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

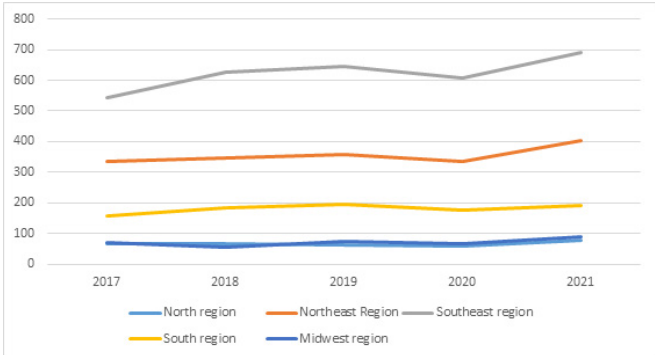


Graph 4 Distribution of days spent in hospital due to epilepsy in Brazil, from 2017 to 2021.

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

The Southeast had a decline in the average number of days hospitalized from 2020 onwards, in the Northeast there was an increase in the average number of days spent in hospital, in this period, from 2020 onwards. In the North and Central-West regions, there was a peak in 2019, with a decline thereafter, and the South region maintained a stable trend in this average. When evaluated by the year of distribution, the average length of stay is relatively stable, with n=6 in the years 2017, 2018 and 2019, with a slight increase, in 2020: n=6.2 and in 2021 n=6.1.

Deaths in hospitalizations due to epilepsy in Brazil, from 2017 to 2021 (Graph 5), totaled n=6484 deaths, remained somewhat stable, although with a slight increasing trend, then had an upward trend from 2020 to 2021 in all regions. The year 2020 was the year with the biggest decline in deaths from epilepsy in the period under study. There was a greater number of deaths in the Southeast: n=3109 deaths; Northeast: n=1780; South: n=903; Central-West: n=357 and North: n=335 deaths.



Graph 5 Distribution of deaths in hospitalizations due to epilepsy in Brazil, from 2017 to 2021.

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

The mortality rate in hospitalizations for epilepsy in Brazil, from 2017 to 2021, was n=2,46. Regarding the years, there was an increasing trend of these deaths in Brazil, in 2017: n=2,28; 2018: n=2,37; 2019: n=2,38; 2020: n=2,52; 2021: n=2,72. Regarding the region: North: n=2.27; Northeast: n=2.76; Southeast: n=2,88; South: n=1,63 and Central-West: n=1,65. Demonstrating a certain oscillation in some regions, as can be seen in graph 8, with an increasing trend in the north, south, southeast and central-west regions and a slight decline in the Northeast.

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Discussion

In the period from 2017 to 2021, there were 263988 hospitalizations due to epilepsy in Brazil, these high numbers of hospitalizations corroborate the findings of DE LIMA et al.,[8] who comment that epilepsy is one of the main neurological diseases throughout thete world, with a high percentage in developing countries, among which we are located. There was an increase in these hospitalizations from 2017 to 2019, with a decrease in 2020 and again with an increasing trend in 2021, a trend observed since the beginning of the period.

This reduction in hospitalizations in 2020 was also observed for other diseases, such as cardiovascular diseases. NORMANDO et al.[9] comment that due to the restriction of circulation linked to the COVID 19 pandemic, observed in Western countries, associated with logistical challenges in providing care for COVID 19 with the direction of the assistance apparatus that even involved hospitalization beds relocated for assistance to COVID 19, perhaps there have been restrictions on hospitalizations, exams and elective procedures also in relation to epilepsy. This fact, already mentioned by Santos-Peyret,[10] who tells us that it is possible to analyze remarkable results in 2020, and can assume a great influence of the COVID-19 pandemic.

On the other hand, although information about this disease is still insufficient, due to the failed diagnosis, notably due to the professional difficulty in dealing with this chronic disease, in Brazil this problem is alleviated by the Mortality Information System (SIM). Finally, even at the risk of underreporting, underreporting that may occur with epilepsy does not prejudice interpretations of temporal trends, confirming this means of information as a necessary instrument for epidemiological analysis.[11]

Thus, even with technological advances, which have made it possible for patients with epilepsy to use tools, such as telemedicine, in order to facilitate treatment and speed up care, especially during this period, it is also reported that it is difficult to contact neurologists, the increased frequency of seizures during the "lockdown" period, financial problems that made treatment difficult, cancellation of appointments, in addition to fear of the current disease, avoiding seeking medical care even with serious epilepsy problems,[12] justify the findings in the study in question of the reduction in hospitalization days and hospital stays in 2020 for these patients.

Epilepsy, being one of the most prevalent neurological comorbidities in the world, became vulnerable during this period, when greater medication support was required for these patients, as epileptic syndromes, especially in the pediatric population, require treatment with corticosteroids, which leads to immunosuppression, and makes the patient part of the risk group for a poor prognosis of the disease.[13] It was observed in a study that, of the 401 notifications of hospital admission, the highest incidence was in children aged 1-4 years, representing approximately 26%. In this way, it is in line with our study, showing that the childhood age group represented the largest hospital search for epilepsy. Therefore, early diagnosis is essential to avoid refractory crises and future complications in childhood.[14]

Among neurological disorders, epilepsy had an increase in hospital admission rates in the literature analyzed in children under 5 years of age, requiring 7 times more hospitalizations, when compared to children who do not have chronic diseases. The recognition of chronic illnesses in this portion of the population in recent years has led to a reduction in hospitalizations in public health services in Brazil, however epilepsy still remains one of the most frequent reasons for hospitalization in childhood, second only to diseases of the respiratory system. Finally, even if there is a stabilization or decrease in the number of hospitalizations for epilepsy, this does not mean a reduction in the number of cases and injuries of this disease in the child population, requiring greater structuring to provide appropriate assistance for this population.[15]

In the racial context, data on individuals hospitalized for epilepsy in Brazil are difficult to analyze and draw conclusions, as there is a weakness in the secondary data observed, with the Nordesde and Central-West having incomplete elements, in addition to the South and Southeast having white as the main hospitalization.[16] These facts contradict the study in question, which has the mixed race as a reference in the number of hospitalizations in all states of the country.

In the period studied between 2017 and 2021, hospitalizations for epilepsy in all macro-regions were more common in males. There was agreement with past investigations, in which the hospitalization profile for this disease, not only at national level but also in each state, was male,[16] and it could be speculated that this finding is justified by epilepsy being more common in men, mainly because the disease is related to trauma. Although it is reasonable to believe that, in Brazil, there is greater adherence to treatment among females, it cannot be ignored that this difference, between sexes, may be increased due to failures in filling out death certificates.[11]

Epilepsy is a disease with high psycho-socioeconomic costs, whether direct (e.g. hospitalizations, transportation, medications, caregivers, etc.) or indirect (e.g. unemployment). Bastos et al.[17] presents the list of direct medical-hospital costs in the city of Rio de Janeiro, in which, even with high-cost medications being provided by the government, 80% of patients still end up bearing this cost, justifying it with the unavailability of medications at distribution sites, bureaucratic issues or lack of knowledge of this right. Furthermore, the second most costly factor is hospital admissions, which in this study reports being of lower value than studies carried out in developed countries, being explained by the access to new technologies they have.

In this regard, although there is effective treatment for epilepsy, it is not available for every individual with this problem. A study carried out in two cities in the Southeast (Campinas and São José do Rio Preto) shows that even though there were enough medications in pharmacies, only half of the population was treated correctly, either due to lack of awareness or the stigma associated with this disorder,[18] which attests that although studies are still scarce and carried out in few cities, they corroborate the high cost that this disease brings, especially in large centers, favoring, for example, poor adherence to treatment, decompensation of the disease and the consequent increase in hospital admission costs, as can be seen in our work in the Southeast region.

However, higher spending in one region compared to another is not necessarily linked to scientific or medical differences, and may have implications for the health system or sociocultural expectations. In another study studied, it was possible to observe the fact that the South has a greater assistance profile in the private sector than in the public sector in comparison to other macro-regions, which could, therefore, bias the data found.[16] Thus, a reduction in the number of hospitalizations due to epilepsy was found in the period studied in this region, mainly from 2020 onwards, attesting to the dependence of this state on the private sector. Studies indicate that there was a global reduction in the mortality rate due to epilepsy in Brazil in the 2000s, with a considerable increase of 80% in the Northeast.[11] Another research states that this northeastern region had a mortality rate for epilepsy 73.5% higher than the national rate.[16]

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In our work, this rate has been declining slightly since 2020 in this region, suggesting a counterpoint to the justifications used for this fact, such as adequate treatment of the disease, especially the availability of medication and surgical treatment.[19–21] CARRIZOS, FISIOPA, GALLUCCI NETO It must be taken into account that at the time of the pandemic, due to the great psychological and emotional stress, in addition to the theory that many viruses can play a role related to a primary infection of the nervous system,[22] it was proven that these Situations can induce epileptic seizures, in addition to other neurological problems, resulting in greater complications and an increase in deaths related to this disease.[23]

Furthermore, there are determinants that would make deaths from this disease preventable, such as the refusal to seek hospital care, the lack of training of professionals and their incompetence, lack of resources and medicines, in addition to the socioeconomic conditions of those with this disease.[24,25] Such information indicates a greater concern with this group of people, because although epilepsy has made progress in the aforementioned aspects over the decades, they are still not enough to resolve the obstacle, resulting in the finding in our study of an increase in mortality from of the year 2020, in all regions of Brazil.[26–31]

Final considerations

Epilepsy is a very common disease in our country, which involves a large number of hospitalizations, representing a high cost to the health system and great harm to the lives of its sufferers, considering that it is a treatable disease and whose hospitalizations and deaths can result of treatment failures, it is pertinent that epidemiological knowledge of this disease in Brazil promotes improvements in the management of the disease among academics and health professionals and can support the direction of public policies so that improvements in public policies strategies to combat this disease can minimize the damage caused by such pathologies and, whenever possible, prevent them and minimize sequelae, thus reducing deaths in the medium and long term and also reducing costs.

Acknowledgments

None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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