

# Prevalence of multiple sclerosis in Goiânia, Goiás, Brazil

## Prevalência de esclerose múltipla em Goiânia, Goiás, Brasil

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### ABSTRACT

Multiple sclerosis (MS) prevalence, in some cities in Brazil, was estimated and was found to range from 0.75 to 30.7/100,000. The reasons for such a large variation in rates of prevalence are not clear, but environment and genetics help to explain this phenomenon. **Methods:** A cross-sectional study using three sources of case ascertainment to estimate the prevalence of MS in the city of Goiânia in December, 2015. **Results:** A total of 318 MS patients was found after removing overlapping sources. The prevalence of MS was 22.4/100,000 population. **Conclusion:** Our study was the first in Goiás and the third in the midwest region, and we found a great increase in the prevalence of MS in the region. It is necessary to perform other studies using the same methodology for a more accurate evaluation of the true prevalence of MS in Brazil.

**Keywords:** Prevalence; multiple sclerosis; neurology.

### RESUMO

A prevalência de esclerose múltipla (EM) no Brasil foi estimada em algumas cidades e foi encontrada entre 0,75 e 30,7 / 100.000. As razões para tal grande variação nas taxas de prevalência não são claras, mas existem aspectos ambientais e genéticos para explicar esse fenômeno. **Métodos:** Foram utilizadas três fontes de averiguação de casos para estimar a prevalência de esclerose múltipla (EM) no município de Goiânia em dezembro de 2015. **Resultados:** Foram encontrados 318 casos de EM, retirando as sobreposições de fontes. A prevalência foi de 22,4 / 100.000. **Conclusão:** Nosso estudo foi o primeiro em Goiás e o terceiro na Região Centro-Oeste, e encontrou um grande aumento na prevalência de EM na região. É necessário realizar outros estudos utilizando a mesma metodologia para uma melhor avaliação da real prevalência da EM no Brasil.

**Palavras-chave:** Prevalência; esclerose múltipla; neurologia.

Multiple sclerosis (MS) is an inflammatory, demyelinating and degenerative disease of the central nervous system, of unknown etiology but supposedly associated with the interaction of genetic, infectious and environmental factors, more often affecting young adults, Caucasians and females. The disease is characterized by repeated episodes of neurological symptoms affecting several parts of the central nervous system, called functional systems, resulting in a great variability of symptoms, which typically

include cognitive, sensory and motor alterations<sup>1</sup>. The prevalence of MS varies considerably worldwide. Kurtzke has designated a three-zone global prevalence rating: high (30–80 per 100,000), medium (5–25 per 100,000), and low zones (< 5 per 100,000)<sup>2</sup>. Wade, in 2013, proposed a new global MS prevalence scale with five categories: very high (170–350 per 100,000), high (70–170 per 100,000), medium (38–70 per 100,000), low (13–38 per 100,000), and very low (0–13 per 100,000)<sup>3</sup>. It was estimated that Brazil was in the

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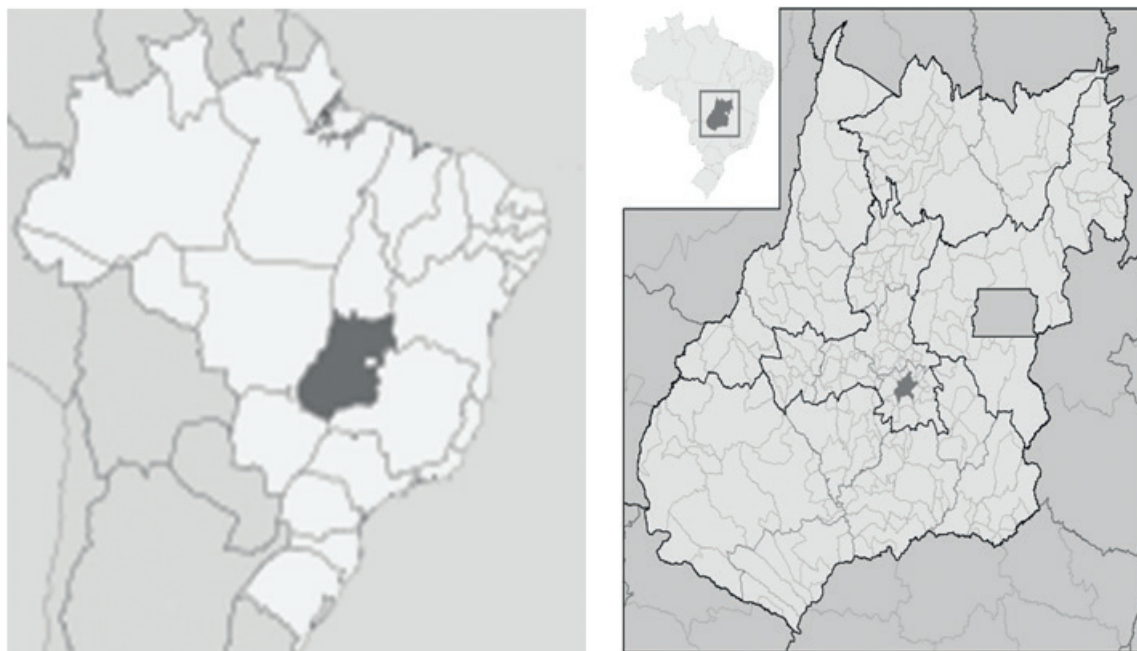


Figure 1. Location of Goiânia in the state of Goiás, Brazil<sup>9</sup>.

medium zone by Kurtzke, and in the low zone by Wade.<sup>2,3</sup> Brazil is a country covering a very large area, located between latitudes 5°16'20"N and 33°44'42"S, and with five geographic regions: north, south, midwest, southeast and northeast, with widely diversified geographic, demographic and population aspects between the regions<sup>4</sup>. The crude prevalence rates of MS found in studies conducted in Brazil ranged from 1.36/100,000 inhabitants in Recife (northwest region)<sup>5</sup> to 27.2/100,000 inhabitants in the city of Santa Maria, Rio Grande do Sul (south region)<sup>6</sup>. The only study that used the capture-recapture method was conducted in Volta Redonda, Rio de Janeiro (southwest region), and found 30.7/100,000 inhabitants, the highest prevalence in Brazil<sup>7</sup>. The aim of the present study was to determine the prevalence of MS in Goiânia, a city located in the midwest region of Brazil, using multiple sources of case ascertainment.

## METHODS

### Study site

Goiânia is capital of the state of Goiás, located in the midwest region. It is in the heart of Brazil, 209 km from the federal capital, Brasília, and is almost equidistant from all other Brazilian states<sup>8</sup> (Figure 1). It is the second most populous city in the midwest region, being surpassed only by Brasília. Its estimated population was 1,430,697 inhabitants in 2015. Goiânia is the sixth largest city in Brazil, covering an area of 728.8 km<sup>2</sup>, lying near the parallel 16°40'43" south and the meridian 49°15'14" west. The Municipal Human Development Index in Goiânia is 0.832, which is considered to be high by the United Nations Development Program. The

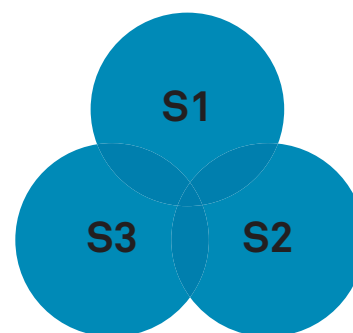


Figure 2. Venn diagram with three sources to gather information on MS patient prevalence. S1 - Dispensing center of high-cost medication, S2 - Centers of reference in the treatment of patients with MS (Hospital das Clínicas/Hospital Geral de Goiânia), S3 - Private neurologists.

longevity index is 0.751 (the overall Brazilian index is 0.638). Goiânia is a multiracial city, having a mixed population, comprising white (48%), brown (44%), black (5.68%), indigenous (0.16%) and yellow (1.68%) people<sup>4,8</sup>.

The day of MS prevalence determination was December 31, 2015.

### Ethics

The study was approved by the committee of ethics and research. CAAE: 59067616.2.0000.5083.

### Ascertainment of cases of MS

The tracking was conducted via three sources (Figure 2).

Patients were screened through the International Code of Diseases (ICD 10): G35. A basic questionnaire for the standardized collection of data was prepared. All data were

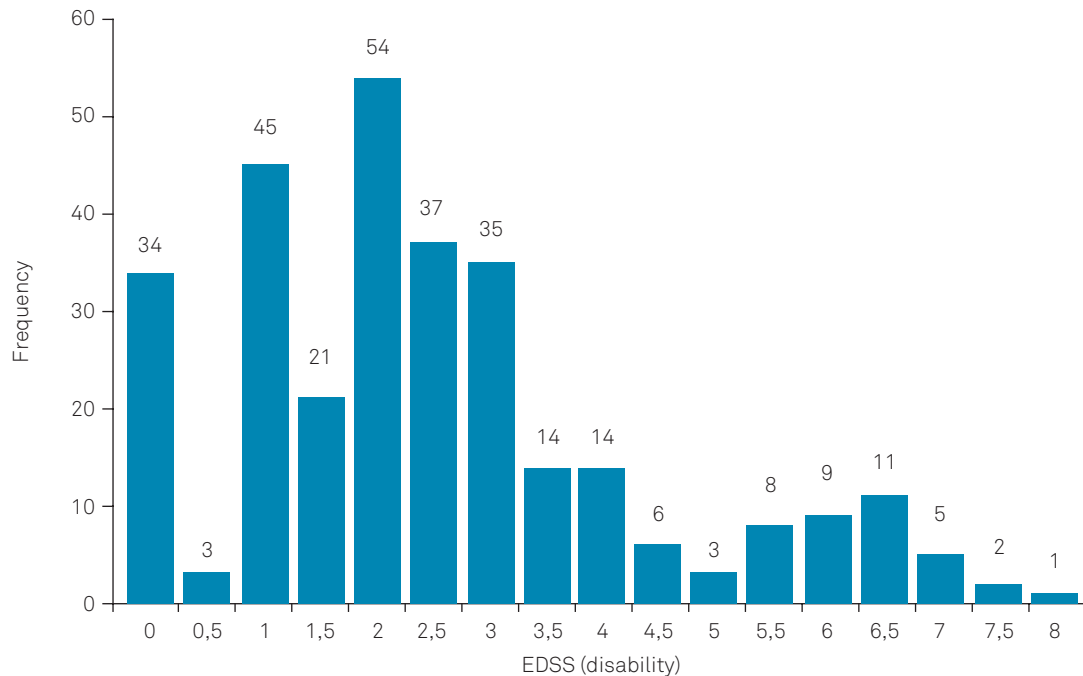


Figure 3. Year of diagnosis.

collected from medical records, and the informed consent form was dispensed with. All patients were alive on December 31, 2015, the day of the prevalence study.

### Classifications and definitions

The MS had been previously diagnosed by the attending physician of each patient. To be included in the study, all diagnoses of MS must have been defined with the Poser diagnostic criteria<sup>9</sup> and/or the McDonald criteria<sup>1</sup> and the patients had to reside in the city of Goiânia.

### Data analysis

Crude prevalence was calculated as the number of MS patients divided by the total number of individuals living in Goiânia in Decer, 2015. An analysis of simple linear Spearman's correlation for quantitative variables was performed. Analyses were performed using the SPSS software, version 25.0 for Windows<sup>10</sup>.

## RESULTS

According to the latest demographic census carried out in Brazil in 2010, the population of Goiânia was 1,302,001 inhabitants, of whom 681,144 were women and 620,857 were men. By 2015, the estimated population was 1,430,697<sup>8,11</sup>.

The study found 318 cases of people with MS residing in Goiânia on the day of the prevalence study (12/31/2015), representing a crude prevalence of 22.2/100,000 inhabitants. The distribution of patients with MS according to socio-demographic factors and clinical characteristics are described in Figure 3 and Table 1.

Table 1. Clinical and demographic characteristics of patients diagnosed with MS in the city of Goiânia, 2015.

Clinical and demographic characteristics of patients	f	%
Sex		
Male	74	23,3
Female	244	76,7
Total	318	100,0
Ethnicity (self-reported)		
White	230	72,3
African	67	21,6
No information	21	6,60
Total	297	100,0
Clinical form		
Relapsing-remitting (RRMS)	276	86,2
Secondary progressive (SPMS)	27	8,5
Primary progressive (PPMS)	1	0,9
No information	14	4,4
Total	304	100,0
Source 1 – Drug dispensing pharmacy		
No	69	21,7
Yes	249	78,3
Total	318	100,0
Source 2 – Reference centers for MS treatment		
No	233	73,3
Yes	85	26,7
Total	318	100,0
Source 3 – Neurologists		
No	217	68,2
Yes	101	31,8
Total	318	100,0
Degree of disability		
No disability	103	32,4
Mild disability	91	28,6
Moderate disability	80	25,2
Severe disability	28	8,8
No information	16	5,0

It is important to emphasize the limitations of the study, especially the fact that it was a retrospective study.

## DISCUSSION

In the city of Goiânia, the prevalence of MS was 22.2/100,000, on December 31, 2015. In a literature review<sup>11</sup> evaluating the MS prevalence in Brazil as a whole, 19 studies were found, out of which 13 studies were carried out in cities in the southeast<sup>12,13,14,15,16,17,18,19,20,21,22,23,24</sup>, two in the southern region<sup>6,25</sup>, two in the midwest<sup>26,27</sup> and one in the northeast<sup>5</sup>.

Great variability was found in the values of maximum and minimum prevalence rates in the prevalence studies conducted in the country. There was an overall prevalence of 8.69 (95%CI 6.0–12.6) per 100,000 inhabitants. Regarding the methodologies employed, all the Brazilian studies adopted a cross-sectional design, using raw data from sources such as hospitals, information from neurologists, MRI services, patients' associations, reference centers and high-cost pharmacies. What did vary in these studies was the number of sources used by each author.

Most authors used more than one source for the data collection. Brazil covers a large area, which diversifies geographic, demographic and historical aspects of the regions and the Brazilian population.

In the midwest region there were only two studies of MS prevalence. The first study was conducted in Brasília, Federal District, from 1999 to 2003, and the authors found a prevalence of 5.85/100,000<sup>26</sup>. The second study was undertaken in the western region, in the city of Cuiabá, Mato Grosso, and showed a prevalence of 4.41/100,000 in 2002<sup>27</sup>.

The methodology was similar in our study and the Cuiabá study (information from various sources). There was no difference in the studies in Brasília, Cuiabá and Goiânia for sex

**Table 2.** Clinical and demographic characteristics of patients with MS in the midwest region, Brazil (%).

Variable	Brasília	Cuiabá	Goiânia
Female sex	77.5	74.0	76.7
White ethnicity	75.7	74.0	72.3
Clinical form			
Relapsing-remitting	90.6	69.5	86.2
Secondary progressive	4.6	21.7	8.5
Primary progressive	3.9	8.6	0.9
No information	0.9	0.2	4.4

and ethnicity. White ethnicity was predominant and the calculation of the sex ratio indicated a greater predisposition of females to contract MS, corroborating most epidemiological studies in Brazil (Table 2).

Analyzing the clinical form of MS, we observed a similarity of the present study with the results from Brasília (90.6% relapsing-remitting MS), while in Cuiabá 69.5% had the relapsing-remitting form.

We found a significant increase in the number of diagnoses since the year 2005 (Figure 3), and most Brazilian studies conducted after the year 2000 also showed a higher prevalence of MS. This increased prevalence can be attributed to the creation of specialized nuclei for the MS patients' care, better training of neurologists in neuroimmunology, and the introduction of MRI services (Figure 3).

In conclusion, we expect to contribute with this descriptive epidemiological study of MS in Goiânia, Goiás, Brazil, and encourage researchers to develop further studies on this disease in different regions of Brazil as there is epidemiological evidence indicating an increased prevalence of multiple sclerosis in areas previously considered to have a low prevalence, as in the case of Brazil in Latin America.

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