

Mortality from epilepsy

Brazil (capitals), 1980-2007

Marleide da Mota Gomes¹

ABSTRACT

Objective: To provide data about age, gender, time and space variation by means of mortality statistics from epilepsy in Brazil. **Method:** It was used demographic and mortality data obtained from the Brazilian Ministry of Health, regarding Brazil (capitals) over the calendar years 1980-2007. For the description of the data it was used Microsoft Office Excel 2007 spreadsheet, and figuring of trends by linear regression, GraphPad Prism 5.0. **Results:** There is a tendency to elderly mortality, and male mortality in almost age group, although regarding the relative frequency rates by age, 20-39 age strata is more representative. The mortality at home is proportionally predominant at 20-29 years of age, 47.52%. Adjusted death rates/100,000, 2007, do not show clear regional predominance. **Conclusion:** We can infer that various deaths coded as epilepsy, may be due to an acute symptomatic seizures. Sudden unexplained death in epilepsy (SUDEP) may be misdiagnosed and probably more represented at the group with more deaths at home.

Key words: epilepsy, mortality, death certificates.

Mortalidade por epilepsia: Brasil (capitais), 1980-2007

RESUMO

Objetivo: Prover dados sobre idade, gênero, tempo e variação espacial por meio de estatísticas de mortalidade por epilepsia no Brasil. **Método:** Foram usados dados demográficos e de mortalidade do Ministério de Saúde brasileiro, relativos ao Brasil (capitais) durante os anos 1980-2007. Para a descrição dos dados foi usado o Microsoft Office Excel 2007 planilha eletrônica; foi feita demonstração de tendências através de regressão linear, GraphPad Prisma 5.0. **Resultados:** Há uma tendência ao aumento da mortalidade em anciãos, e da mortalidade masculina em quase todas faixas etárias, embora taxas de frequência relativas por idade, 20-39 anos, sejam mais representativas. Taxas ajustadas de mortalidade/100.000, 2007, não demonstraram predominância regional. A mortalidade em domicílio é proporcionalmente predominante no adulto jovem, 20-29 anos. **Conclusão:** Nós podemos deduzir que várias mortes codificadas como epilepsia podem ser devidas a crises epilépticas sintomáticas agudas. Morte súbita inexplicada por epilepsia (SUDEP) pode ser mal diagnosticada e provavelmente mais representada no grupo com mais óbitos em casa.

Palavras-chave: epilepsia, mortalidade, certidões de óbito.

The risk of death for a person with epilepsy is two to three times greater than that of the general population^{1,2}. Regarding death certificate, traditionally, only the data on underlying cause-of-death (UCD) is considered in mortality analysis³. Data on UCD in epileptic patients is of limited value for the diagnosis of epilepsy in the population due to its low case fatality

ratio^{3,4}, also it is not so straightforward for the study of cause-specific deaths, as mentioned by Hitiris et al.¹. Although, death is now recorded to a highly accurate standard in many countries¹. Death certificates may fail to mention epilepsy as a causative or contributory factor, and often list a range of other medical conditions that are irrelevant to the cause of

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death^{1,3}. In England, as Bell et al.⁵ reported, and also in Brazil, the diagnosis of epilepsy may be correctly absent from the death certificate, because the information required is that of conditions leading to death, and of other conditions contributing to death. The same authors emphasized that if the patients had ongoing seizures before death, they may be more likely than others people with epilepsy to have epilepsy on the certificate. Schraeder et al.² report that sudden unexplained death in epilepsy (SUDEP) appears to be an underused final diagnosis. It is a valid entity greatest among pathologists (83.5%) versus other physicians and non-physicians (P<0.001). In Sweden, Jansson and Ahmed³ reported that the most common UCD in epileptics was diseases of the circulatory system (34.4%) followed by epilepsy (31.7%). Injury and poisoning were coded as UCDs for 5.8% of these patients. Injury and poisoning as a contributory cause-of-death increased significantly, but not as an UCD during the study period. The proportion of each diagnostic group as an UCD decreased by 35% for epilepsy and 18% for injury from 1981 and onwards. The authors remember that these changes should be interpreted with caution since changes of coding practice are more likely to be the cause of them. The aim of the present study was to analyze the longitudinal trend and distribution according to gender and age strata in the National mortality data, 1980-2007, among the population having epilepsy as UCD.

METHOD

The data used was from the Mortality Information System (MIS)/Ministry of Health, over the calendar years

1980-2007, based on the Brazilian List for Mortalidade, 9th revision of the International Classification of Disease (Br-ICD-9), 1980-1995, and Br-ICD-10, 1996-2007. The Br-ICD takes in account the causes of more important deaths in Brazil, including all the minimum item demanded by the international standards of comparability^{6,7}. MIS classifies deaths as an UCD. The population estimates, from census as between them used as denominators for the calculations of the mortality taxes were obtained through Datasus and supplied by the Brazilian Institute of Geography and Statistics. Using these data, regarding epilepsy death, they were analyzed: [1] crude death rates by quadriennium according to age group (calculated using the deaths means due to epilepsy divided by the population means per age group in each quadrennium), and relative frequency rates by age; [2] standardization mortality ratio by age group through the direct method, using the Rio de Janeiro capital as standard population, in 2007 (the equation used was: $\sum (\text{rate by age group}) \times (\text{standard population by age group}) / \sum \text{standard population}$); [3] trends for death rate by sex, from 1980-2007, by means of linear regression; [4] death proportional variation in Brazil (capitals) per sex and total in the 1980 and 2007 years, $((\text{Rate 2007}/\text{Rate 1980})-1) 100$; [5] the deceased's local of death, in the 2004-2007 period. For the description of the data it was used Microsoft Office Excel 2007 spreadsheet, and figuring of trends by linear regression, GraphPad Prism 5.0. The research project uses secondary and grouped data, which do not have information through which the individuals can be identified. It was submitted to the Committee of Ethics

Table. Brazil (capitals), mortality (absolute numbers, relative frequency rates by age and death rates/100,000) from epilepsy, by time period (1980-2007).

Age	1980-1983			1984-1987			1988-1991			1992-1995			1996-1999			2000-2003			2004-2007		
	N	%	100,000	N	%	100,000	N	%	100,000	N	%	100,000	N	%	100,000	N	%	100,000	N	%	100,000
<1	14	4.96	-	10	3.52	-	7	2.19	-	5	1.67	-	5	1.66	0.75	6	2.11	0.83	5	1.42	0.64
1-4	18	6.32	-	17	5.75	-	10	3.37	-	8	2.75	-	11	3.65	0.42	12	4.05	0.40	12	3.51	0.39
5-9	9	3.34	0.30	9	2.92	0.26	10	3.37	0.28	7	2.25	0.18	6	1.99	0.17	6	2.20	0.18	6	1.87	0.17
10-14	12	4.42	0.41	10	3.52	0.31	18	5.98	0.50	11	3.59	0.28	7	2.40	0.19	5	1.85	0.14	9	2.77	0.24
15-19	24	8.57	0.74	30	10.21	0.89	20	6.74	0.58	20	6.67	0.55	20	6.47	0.49	15	5.10	0.34	17	5.08	0.39
20-29	59	21.21	0.98	56	19.21	0.88	59	19.97	0.88	60	20.02	0.85	57	18.91	0.80	48	16.80	0.61	45	13.45	0.54
30-39	55	19.95	1.37	58	19.90	1.24	68	22.75	1.27	71	23.52	1.23	72	23.80	1.17	53	18.73	0.81	61	18.09	0.86
40-49	39	13.90	1.36	41	14.15	1.30	47	15.75	1.33	48	15.93	1.26	50	16.67	1.14	56	19.61	1.10	64	19.06	1.16
50-59	21	7.40	1.03	26	9.01	1.22	26	8.76	1.12	27	8.92	1.08	31	10.12	1.14	32	11.26	1.01	39	11.66	1.11
60-69	14	5.14	1.24	19	6.43	1.39	15	5.14	0.99	20	6.67	1.20	19	6.38	1.08	20	6.86	0.98	24	7.17	1.12
70-79	8	2.98	1.52	11	3.69	1.70	9	3.12	1.29	14	4.59	1.76	13	4.31	1.44	17	5.89	1.49	28	8.37	2.29
≥80	3	1.17	1.93	3	1.03	1.41	6	2.02	2.34	8	2.75	2.89	9	2.82	2.45	15	5.36	3.45	24	7.17	4.78
Ign	2	0.63	-	2	0.69	-	3	0.84	-	2	0.67	-	3	-	-	1	-	-	1	-	-
Total	277	100	0.94	292	100	0.91	297	100	0.86	300	100	0.82	302	100	0.79	284	100	0.69	335	100	0.76

(-) demographic data; 0-4, not age detailed.

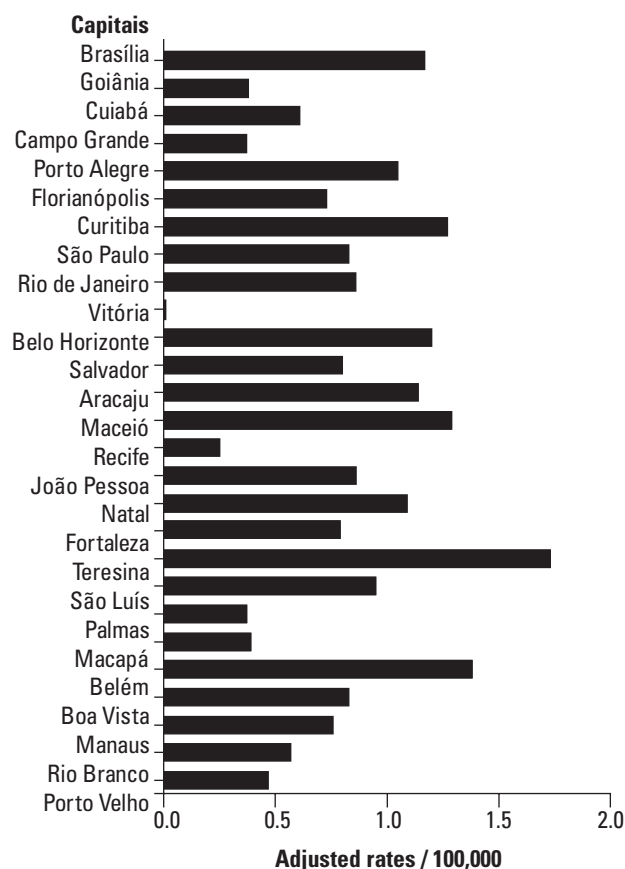


Fig 1. Adjusted mortality rates / 100,000, from epilepsy, Brazil (capitals), 2007

in Research involving Human Subjects of the Instituto de Neurologia da UFRJ, and it was approved.

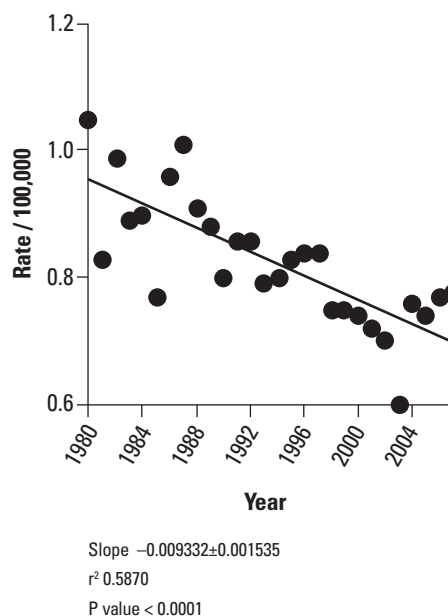
RESULTS

Table shows the death and relative frequency rates for epilepsy, in Brazilian capitals, in the period from 1980 to 2007, by quadriennium. The most expressive specific death rates were observed ≥ 70 years, and the relative frequency rates were observed in the 20-49 age strata. As a whole, the male rates, are higher than the female ones.

Regarding only one year of analysis (2007), some capitals presented higher standardized mortality ratios, not characterizing a regional higher level of mortality (Teresina city, in the northwest, with the highest) (Fig 1).

The results concerning the behavior of the crude mortality ratios and the analysis of the temporal trend of the mortality due to epilepsy in the Brazilian capitals in the period from 1980 to 2007 are shown in the Fig 2: decreased trend, although increased in the last studied years.

In relation to the place of death, the young adult and the very young / very old have the extremes of the relative frequency rates: 20-29, 47.52%, at home; ≥ 80 , 63.47%, 1-4, 74.09%, at the hospitals.



Year	Male	Female	Total
1980	1.33	0.79	1.05
1981	1.05	0.64	0.83
1982	1.17	0.82	0.99
1983	1.01	0.78	0.89
1984	1.11	0.72	0.90
1985	1.01	0.55	0.77
1986	1.26	0.68	0.96
1987	1.25	0.79	1.01
1988	1.20	0.65	0.91
1989	1.21	0.58	0.88
1990	1.10	0.53	0.80
1991	1.09	0.65	0.86
1992	1.14	0.60	0.86
1993	1.09	0.52	0.79
1994	1.04	0.57	0.80
1995	1.16	0.51	0.83
1996	1.15	0.56	0.84
1997	1.18	0.53	0.84
1998	1.00	0.52	0.75
1999	1.04	0.48	0.75
2000	0.97	0.52	0.74
2001	0.93	0.53	0.72
2002	0.98	0.44	0.70
2003	0.80	0.42	0.60
2004	1.04	0.50	0.76
2005	0.97	0.53	0.74
2006	1.00	0.56	0.77
2007	0.99	0.60	0.78
% variation (1980 × 2007)	-25.56	-24.06	-25.71

Fig 2. Mortality trend from epilepsy, Brazil (capitals), by sex and total (also at left), 1980-2007.

DISCUSSION

Our results showed that the epilepsy rate in Brazil (capitals) decreased, and that there is a more prominent rates among the elders and men. Risk factors for death for epilepsy seem to differ by age and gender. Our study

showed a pattern in gender and age-specific death rates from epilepsy similar of that from the Ferreira e Silva⁷ study, and coincident with several mentioned by Hitiris e al.¹: more in men and aged, the last more prone to acute symptomatic seizures. Although, Hesdorffer et al.⁸ argue against the inclusion of acute symptomatic seizures as epilepsy, because acute symptomatic seizures have a higher early mortality and a lower risk for subsequent unprovoked seizure. The level of epilepsy death rate might be significantly affected by the undetermined death in epileptics. There are some limitations to the interpretation of the death data, because of the “epilepsy definition” and “misclassification error”. We will now explore the possible reasons underlying the recent increasing trends of the rates such as change of coding and for instance preterition of the pneumonias as UCD: epilepsy prevailing in the CID-10, in detriment of pneumonias⁹. Other causes may be a better epilepsy recognition and diagnosis in the last years, and the evolution in the covering of the MIS⁷. Schraeder et al.² recommend that there is a need to educate officials at all levels about the diagnosis of SUDEP in persons who have epilepsy with no other cause of death. SUDEP may be misdiagnosed and probably more represented at the group with more deaths at home: young adults.

There are problems associated with collection of mortality data, and the record of death related and unrelated to epilepsy in mortality statistics / death certificates. Although, regarding the scarcity on population-based studies of epilepsy mortality in Brazil, analysis of the age, gender, temporal trend and geographical varia-

tion by means of mortality statistics is a key issue in descriptive epidemiology and may provide useful suggestions for planning further studies. The development of the premature death for epilepsy prevention strategies and assessment of the correct fulfillment of the death certificate should be considered to clearly differentiate acute symptomatic seizures, in the underlying or contributing cause-of-death, from epilepsy with no other cause of death (SUDEP).

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