

AWARENESS OF STROKE RISK FACTORS AND WARNING SIGNS IN SOUTHERN BRAZIL

Asdrubal Falavigna¹, Alisson Roberto Teles², Viviane Maria Vedana²,
Fabrício Diniz Kleber², Gabriela Mosena², Máira Cristina Velho²,
Thaís Mazzocchin², Roberta Castilhos da Silva², Luzia Fernanda Lucena²,
Juliana Tosetto Santin², Felipe Roth²

Abstract – **Objective:** To evaluate the knowledge about stroke in Caxias do Sul. **Method:** A closed-ended, self-administered questionnaire was used to assess the knowledge about stroke among residents of Caxias do Sul. In order to verify variables associated to lack of knowledge we defined three main end points: (1) the inability to recognize that stroke is a disease that affects the brain; (2) insufficient knowledge of risk factors; (3) insufficient knowledge of signs and symptoms of acute stroke. **Results:** A total of 952 subjects answered the questionnaire. Lower income and lower educational level were independent factors associated to inability to recognize that stroke affects the brain. Lower income and being under 50 years old were independent risk factors to lack of knowledge concerning stroke risk factors. Lower educational level was the unique risk factor for insufficient knowledge about stroke warning signs. **Conclusion:** There is a lack of knowledge about stroke in Caxias do Sul. People with lower socioeconomic status and lower education level should be the targets of educational campaigns.

KEY WORDS: stroke, knowledge, risk factors, warning signs, general population.

Avaliação de fatores de risco de doença cerebrovascular no sul do Brasil

Resumo – **Objetivo:** Avaliar o conhecimento sobre doença cerebrovascular em Caxias do Sul. **Método:** Um questionário auto-administrado, com questões objetivas, foi utilizado para avaliar o conhecimento sobre doença cerebrovascular em residentes de Caxias do Sul. A fim de verificar as variáveis associadas à falta de conhecimento, definiram-se três principais desfechos: (1) incapacidade de reconhecer que o derrame é uma doença que afeta o cérebro; (2) conhecimento insuficiente sobre fatores de risco; (3) conhecimento insuficiente sobre sinais e sintomas de acidente vascular encefálico. **Resultados:** Um total de 952 sujeitos responderam o questionário. Menor renda e menor nível socioeconômico foram fatores independentes associados à incapacidade de reconhecer que derrame afeta o cérebro. Menor renda e ter menos que 50 anos de idade foram fatores independentes associados à conhecimento insuficiente sobre fatores de risco para doença cerebrovasculares. Menor nível educacional foi o único fator de risco independente associado à conhecimento insuficiente sobre sinais de alerta do acidente vascular encefálico. **Conclusão:** Há uma lacuna de conhecimento sobre doença cerebrovascular em Caxias do Sul. Pessoas com menor nível socioeconômico e menor nível educacional deveriam ser o alvo para campanhas educacionais.

PALAVRAS-CHAVE: acidente vascular encefálico, conhecimento, fatores de risco, sinais de alerta, população geral.

Stroke is a major public health problem and the leading cause of mortality in Brazil^{1,2}. Nevertheless, it is still a neglected disease in this country, where a great number of patients does not get the specific treatment because of

the delay in the diagnosis and the absence of the recombinant tissue plasminogen activator (rt-PA) in the public hospitals network²⁻⁴. The awareness of stroke warnings signs influence on the delay of presentation in the hospitals^{3,5}.

¹Professor of Neurology and Neurosurgery, University of Caxias do Sul, Caxias do Sul RS, Brazil, Coordinator of the Liga Acadêmica Multidisciplinar de Neurologia e Neurocirurgia da Universidade de Caxias do Sul (LAMNN-UCS); ²LAMNN-UCS.

Received 20 May 2009, received in final form 2 June 2009. Accepted 3 August 2009.

Dr. Asdrubal Falavigna – Rua General Arcy da Rocha Nóbrega 401 / 602 - 95040-290 Caxias do Sul RS - Brasil. E-mail: asdrubal@doctor.com

Only one quarter of stroke patients correctly interpret their symptoms as representing a stroke, and even when they know that it is a stroke, most present late because they perceive their symptoms as “not serious”⁵.

The perception of “having risk factors” to stroke and the knowledge of these factors are associated with better control of comorbidities and better adherence to preventive therapy after stroke⁶. In a recent study we pointed out how the patients’ thoughts and beliefs about the disease and its risk factors could affect the way in which the patients will react to an episode of stroke, often contributing to the delay to seek appropriate medical attention and compromising the initial treatment⁷. This is especially important in this setting because administration of intravenous rt-PA in a narrow time window sooner after stroke improves outcomes^{6,8}, especially within 90 min after the onset of symptoms.

In the present study, we aim to evaluate the knowledge of risk factors and warning signs of stroke in residents of Caxias do Sul, analyzing factors associated with lack of awareness in society in order to identify subgroups that would be more benefited by educational stroke campaigns.

METHOD

Design and sample

This study was carried out in Caxias do Sul, one of the major Southern Brazilian cities, with an estimated population of 399,038 inhabitants⁹. Individuals were invited to engage the study in two different settings: Community Actions, promoted by University of Caxias do Sul (UCS) in six neighborhoods of the city of Caxias do Sul, and college students from University of Caxias do Sul. Community Actions are events in a project carried out by UCS, intending to provide information and services in medicine, social welfare, law, biology, psychology and physical education to communities in the local neighborhoods and towns of the region. The questionnaires were applied to the university students during class.

The inclusion criteria were: being over the age of 16, having some schooling and agreeing to participate in the survey by signing a letter of consent. At the end of the interview they were given an explanatory leaflet written by Liga Acadêmica Multidisciplinar de Neurologia e Neurocirurgia da Universidade de Caxias do Sul. The leaflet had general information on stroke, including epidemiology, risk factors, clinical manifestations, and treatment.

The study was submitted to the Ethics and Research Committee of the University of Caxias do Sul and began after approval.

Instrument

A closed-ended, self-administered questionnaire was used to access the knowledge on stroke among the sample. Most of the questions have already been used in previous studies^{3,5,10-16}.

The questionnaire presented had questions about: (1) demographic aspects (gender, age, income and educational level); (2) presence of risk factors, previous history of a stroke and family history of cerebrovascular disease; (3) knowledge of risk factors; (4) knowledge of signs and symptoms of stroke.

All the subjects who answered that they already had a stroke episode and were inquired again about this fact after the completion of the questionnaire with the objective to increase the accuracy of the question. We considered as a positive family history of stroke when the subjects answered that they had a close relative with a past medical history of a stroke.

To evaluate the knowledge about stroke risk factors the respondents were asked to point if each factor would be related to an increase, decrease or no alteration at all in the net risk of developing a stroke. The factors listed were: high blood pressure, aspirin use, alcoholism, physical activity, tobacco use, obstructed veins, obesity, niger race, higher number of children, dyslipidemia, arrhythmia, myocardial infarction, age and osteoporosis.

In order to evaluate individuals’ ability to recognize a stroke episode, they were asked to point the signs and symptoms that would raise their attention to the development of a stroke. The signs and symptoms listed were: nasal bleeding, deviation of the mouth, chest pain, irradiating pain to the left arm, weakness, sweating, paralysis of one side of the body, vomiting, visual alterations, trouble speaking, lowering of the blood pressure, lowering of the consciousness level, trouble breathing, fever, acute headache, dizziness and jaundice.

Statistical analysis

The statistical analysis was performed with SPSS® 16.0 for Windows (SPSS Inc., Chicago, IL, USA). The categorical variables were presented as proportions and the age as median plus interquartile interval.

In order to verify variables associated to lack of knowledge we defined three main end points: (1) the inability to recognize that stroke is a disease that affects the brain; (2) insufficient knowledge of risk factors, defined as achieving at least 40% of correct answers in this questions; (3) insufficient knowledge of signs and symptoms of acute stroke, defined as achieving at least 40% of correct answers in this questions.

It were considered as explicative variables: gender, age, income, educational level, family history of cerebrovascular disease and the occurrence of at least one risk factor (previous stroke, high blood pressure, diabetes mellitus, dyslipidemia, smoking and sedentarism). Age and familiar history of stroke were not inserted in this variable because they were analyzed as separate variables. In order to evaluate the associated variables with the three endpoints we conducted bivariate analyses with chi-square test. Finally, all the variables were analyzed together within a logistic regression model, the results being presented as odds-ratio and confidence intervals. Statistical significance was accepted at the level of $p \leq 0.05$.

Table 1. General features of the sample (n=952).

Female / male	73.3% / 26.7%
Age (median; P25–P75)	25 (20–42)
>50	15.5%
≤50	84.5%
Familiar income	
Up to 3 wages	33.0%
Up to 7 wages	38.8%
More than 12 wages	28.3%
Educational level	
Elementary school	23.9%
High school	11.1%
University	64.9%
Familiar history of stroke	44.4%
Stroke risk factor	
Previous stroke	1.4%
Hypertension	11.1%
Diabetes	2.8%
Tobacco use	12.5%
Dyslipidemia	8.6%
Sedentarism	43.2%
At least one stroke risk factor	76.2%

Table 2. Answers about signs and symptoms of stroke.

Stroke signs and symptoms	Frequency
Paralysis of one side of the body	77.6%
Deviation of the mouth	69.9%
Visual alterations	60.8%
Trouble speaking	77.8%
Dizziness	79.0%
Acute headache	76.1%
Non-stroke signs and symptoms	
Chest pain	43.6%
Vomiting	26.9%
Nasal bleeding	33.6%
Sweating	34.1%
Trouble breathing	49.4%
Jaundice	17.2%
Fever	12.1%

RESULTS

A total of 952 subjects answered the questionnaire, 458 in the UCS and 494 in neighborhood campaigns. The demographic characteristics of the sample are shown in the Table 1.

When questioned “what is a stroke” 70.5% of the subjects answered that it is a disease that affects the brain. The remaining 29.1% was unable to identify the brain as the primary target and answered that stroke is a disease that affects the heart (19.3%) or the inferior limbs (2.6%). Nevertheless, 7.6% of the sample did not know what a stroke is.

Figure shows the rates of correct answers about risk factors of stroke¹⁷. Only 5% of the subjects had insufficient knowledge about stroke risk factors. Table 2 demonstrates the frequency of answers acquired from the questions about signs and symptoms of acute stroke. Only 8.1% of the subjects had an insufficient knowledge.

Tables 3, 4, and 5 show the bivariate and multivariate analyses of the associated factors to the three endpoints. Lower income (p<0.0001) and lower educational level (p<0.0001) were independent factors associated to wrong answer to the question “what is a stroke” (Table 3). Lower income was also an independent risk factor to lack of knowledge concerning stroke risk factors (Table 4). Besides, being under 50 year old was another independent factor associated to insufficient knowledge of stroke risk factor, with 6.96 times more likely to have insufficient knowledge (Table 4). Concerning factors asso-

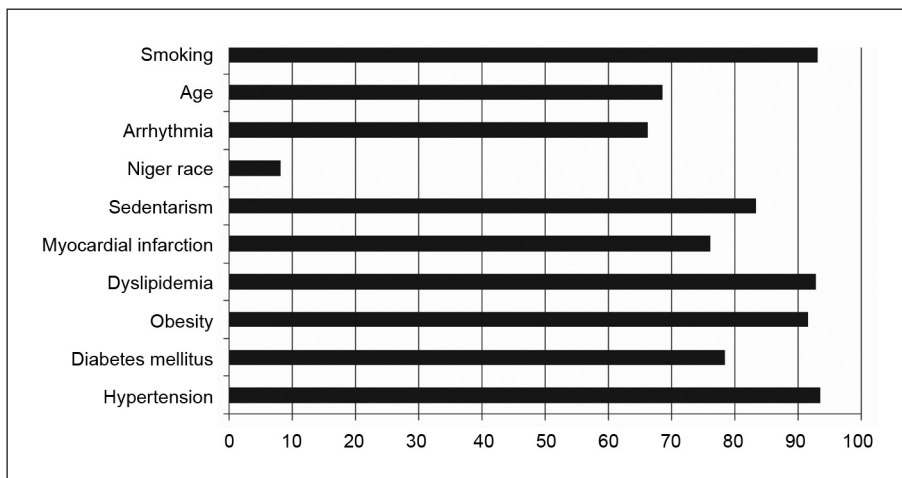


Figure. Percentage of answers about stroke risk factors.

Table 3. Variables associated to inability to recognize that stroke affects the brain.

	Bivariate analyses		Logistic regression	
	Prevalence (29.5%)	p	A-OR (CI95%)	p
Gender		0.006		0.29
Female	27.1%		1.0	
Male	36.2%		1.19 (0.85–1.67)	
Age		0.001		0.91
>50	40.5%		1.0	
≤50	27.5%		1.02 (0.67–1.54)	
Familiar income		<0.0001		<0.0001
More than 12 wages	13.4%		1.0	
Up to 7 wages	31.2%		2.38 (1.55–3.66)	
Up to 3 wages	41.4%		2.56 (1.55–4.22)	
Educational level		<0.0001		<0.0001
University	20.7%		1.0	
High school	50.9%		2.73 (1.67–4.44)	
Elementary school	43.4%		1.94 (1.25–3.02)	
Family history of stroke		0.38		0.22
No	28.4%		1.0	
Yes	31.0%		0.81 (0.58–1.13)	
Stroke risk factor		0.008		0.12
No	22.5%		1.0	
Yes	31.7%		1.39 (0.91–2.12)	

Table 4. Variables associated to insufficient knowledge of stroke risk factors.

	Bivariate analyses		Logistic regression	
	Prevalence (5.0%)	p	A-OR	p
Gender		0.28		0.29
Female	4.6%		1.0	
Male	6.3%		1.42 (0.73–2.76)	
Age		0.02		0.01
> 50	1.4%		1.0	
≤50	5.7%		6.96 (1.60–30.30)	
Familiar income		0.01		0.01
More than 12 wages	1.9%		1.0	
Up to 7 wages	5.4%		3.44 (1.25–9.42)	
Up to 3 wages	7.3%		5.43 (1.80–16.39)	
Educational level		0.27		0.30
University	4.5%		1.0	
High school	3.8%		0.49 (0.15–1.57)	
Elementary school	7.0%		1.21 (0.53–2.74)	
Family history of stroke		0.61		0.43
No	4.7%		1.0	
Yes	5.4%		1.32 (0.65–2.69)	
Stroke risk factor		0.84		0.52
No	5.3%		1.0	
Yes	5.0%		0.76 (0.33–1.75)	

Table 5. Variables associated to insufficient knowledge of stroke warning signs.

	Bivariate analyses		Logistic regression	
	Prevalence (8.1%)	p	A-OR	p
Gender		0.23		0.68
Female	7.4%		1.0	
Male	9.8%		1.11 (0.65–1.89)	
Age		0.001		0.13
≤50	6.8%		1.0	
>50	14.9%		1.57 (0.86–2.88)	
Familiar income		0.04		0.86
More than 12 wages	5.2%		1.0	
Up to 7 wages	7.9%		1.21 (0.60–2.43)	
Up to 3 wages	10.8%		1.18 (0.53–2.65)	
Educational level		0.001		0.04
University	5.7%		1.0	
High school	11.3%		1.66 (1.10–3.69)	
Elementary school	13.2%		1.77 (1.23–3.64)	
Family history of stroke		0.03		0.28
No	6.4%		1.0	
Yes	10.2%		1.34 (0.78–2.31)	
Stroke risk factor		0.07		0.78
No	5.3%		1.0	
Yes	9.0%		1.11 (0.52–2.34)	

ciated to insufficient knowledge of stroke warning signs, lower educational level was the unique independent factor (Table 5).

Regarding the opinion of the subjects concerning the level of awareness of the community towards stroke, 69.2% answered that the population of Caxias do Sul is not well informed about this disease, 21.3% answered that the population is well informed and 9.5% do not had an opinion about this question.

DISCUSSION

Stroke is the leading cause of death in Brazil¹⁸ and one of the most important causes of disability^{17,19}. Since publication of NINDS study in 1995, thrombolysis with rt-PA remains the only authorized treatment for ischemic stroke^{20,21}. Nevertheless, the efficacy and safety of this therapeutical approach is time dependent, as the prevalence of bleeding complications increases with prolonged time, being accepted its usage only within three hours since the onset of symptoms²¹. Therefore, it is extremely important to identify the factors associated with the inability to arrive at the hospital on time to initiate thrombolysis. Barber et al.²² demonstrated that one of the factors involved with the delay and ineligibility to thrombolysis is the lack of awareness concerning the acute symptoms of stroke, leading to misidentification of the disease and the wrong idea of a transitory abnormality.

Despite the fact that stroke was pointed as the main cause of death in Brazil for the past 20 years¹, it has been regarded as a neglected disease². This observation could be corroborated by the lack of knowledge about stroke characteristics in the general population^{10,11,14,15,23}. Even though a reasonable proportion of the participants of our study (70.5%) knew the definition of stroke, almost 30% of respondents did not know the answer (7.6%) or misidentified cerebrovascular disease with a heart or vascular disease (21.9%). Our finding is corroborated by a previous study of Yoon et al.¹⁰, which showed that 73.4% of the subjects identified the brain as the organ of the body where a stroke occurs, and 15.9% thought that stroke is a cardiovascular disease. The socioeconomic level and lower level of education was independent factors associated with wrong answer in the question “what is a stroke”. Other studies have also found this association^{14,23}.

Like previous studies^{15,24} the most common identified risk factors of stroke were hypertension (93.6%), smoking (93.1%) and dyslipidemia (92.8%). We found that being younger than fifty years old as well as low socioeconomic level were risk factors for the lack of awareness about stroke risk factors. Novak et al.¹⁵ found association between low educational level and lack of knowledge about stroke risk factors. Family history of stroke was previously associated with the level of awareness towards stroke but we did not found these association¹⁰.

In study of Blades et al.¹⁶, numbness of the face or part of the body (45%) and speech problems (38%) were the most frequently reported warning signs of stroke¹⁶. Similarly, in our sample the most common sign pointed by respondents were dizziness (79%), speech problems (77.8%) and paralysis of one side of the body (77.6%). Pontes-Neto et al.³, in a large populational study in four major cities of Brazil, demonstrated that 22% of the interviewed subjects were unable to identify any warning signs of stroke. Interestingly when asked to point signs and symptoms that are not associated with stroke, the subjects of our study though that yellow appearance of the skin (17.2%) and fever (12.1%) were more likely to be unrelated to stroke. However, chest pain (43.6%) and dyspnea (49.4%) were pointed as the most uncommon signs and symptoms of stroke.

The design and sampling methods renders some limitations to these study as follows: (1) the distribution of educational level does not resemble the hole community of Caxias do Sul; (2) despite being a common practice in similar studies, the use of self-administered questionnaires to evaluate knowledge has some limitations such as understanding the questions, mainly in less educated people; (3) people engaged the study from Community Actions could have better knowledge about stroke than people who not search this health community campaigns; (4) it were used arbitrary definitions to find people who had stroke risk factors. Despite these limitations, our study brings some relevant information concerning the factors associated with lack of knowledge of stroke among lay people through the utilization of logistic regression model. This evidence could guide future campaigns on stroke awareness focusing on the specific subgroup identified with the worst results, therefore facilitating and increasing the campaign efficacy.

In conclusion, there is a lack of knowledge about stroke in Caxias do Sul. Lower socioeconomic status and lower education level are associated with a reduced knowledge of stroke. With regards to the stroke risk factors, our study identified a poor knowledge among people under 50 years old and people from lower socioeconomic level. Educational campaigns are needed to improve the knowledge of stroke in Caxias do Sul.

REFERENCES

- Mansur PA, Souza MFM, Favarato D, et al. Stroke and ischemic heart disease mortality trends in Brazil from 1979 to 1996. *Neuroepidemiology* 2003;22:179-183.
- Lotufo PA. Stroke in Brazil: a neglected disease. *Sao Paulo Med J* 2005;123:3-4.
- Pontes-Neto OM, Silva GS, Feitosa MR, et al. Stroke awareness in Brazil: alarming results in a community-based study. *Stroke* 2008;39:292-296.
- Falavigna A, Teles AR. Stroke: why do few patients receive adequate treatment? *RCM - UCS* 2008;6:7-9.
- Williams LS, Bruno A, Rouch D, Marriott DJ. Stroke patients' knowledge of stroke. Influence on time to presentation. *Stroke* 1997;28:912-915.
- Sappok T, Faulstich A, Stuckert E, Kruck H, Marx P, Koennecke HC. Compliance with secondary prevention of ischemic stroke: a prospective evaluation. *Stroke* 2001;32:1884-1889.
- Falavigna A, Teles AR, Velho MC, et al. What do the patients with stroke know about their disease? *AMRIGS* 2009;53:2.
- Hacke W, Donnan G, Fieschi C, et al. Association of outcome with early stroke treatment: pooled analysis of ATLANTIS, ECASS, and NINDS rt-PA stroke trials. *Lancet* 2004;363:768-774.
- Demographic census of Brazil 2007. Rio Grande do Sul state. 2007. (Accessed April 5, 2009, at: <http://www.ibge.gov.br/home/estatistica/populacao/contagem2007/defaulttab.shtm>).
- Yoon SS, Byles J. Perceptions of stroke in the general public and patients with stroke: a qualitative study. *BMJ* 2002;324:1065-1068.
- Sug Yoon S, Heller RF, Levi C, Wiggers J, Fitzgerald PE. Knowledge of stroke risk factors, warning symptoms, and treatment among an Australian urban population. *Stroke* 2001;32:1926-1930.
- Reeves MJ, Hogan JG, Rafferty AP. Knowledge of stroke risk factors and warning signs among Michigan adults. *Neurology* 2002;59:1547-1552.
- Pandian JD, Jaison A, Deepak SS, et al. Public awareness of warning symptoms, risk factors, and treatment of stroke in northwest India. *Stroke* 2005;36:644-648.
- Pancioli AM, Broderick J, Kothari R, et al. Public perception of stroke warning signs and knowledge of potential risk factors. *JAMA* 1998;279:1288-1292.
- Novak EM, Zetola VH, Muzzio JA, Puppi M, Carraro-Junior H, Werneck LC. Conhecimento leigo sobre doença vascular encefálica. *Arq Neuropsiquiatr* 2003;61:772-776.
- Blades LL, Oser CS, Dietrich DW, et al. Rural community knowledge of stroke warning signs and risk factors. *Prev Chronic Dis* 2005;2:14.
- Lavados PM, Hennis AJM, Fernandes JG, et al. Stroke epidemiology, prevention, and management strategies at a regional level: Latin America and the Caribbean. *Lancet Neurol* 2007;6:362-272.
- Minelli C, Fen LF, Minelli DP. Stroke incidence, prognosis, 30-day, and 1-year case fatality rates in Matão, Brazil: a population-based prospective study. *Stroke* 2007;38:2906-2911.
- Camargo EC, Bacheschi LA, Massaro AR. Stroke in Latin America. *Neuroimaging Clin N Am* 2005;15:283-296.
- Tissue plasminogen activator for acute ischemic stroke. The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group. *N Engl J Med* 1995;333:1581-1587.
- [Brazilian consensus for the thrombolysis in acute ischemic stroke]. *Arq Neuropsiquiatr* 2002;60:675-680.
- Barber PA, Zhang J, Demchuk AM, Hill MD, Buchan AM. Why are stroke patients excluded from TPA therapy? An analysis of patient eligibility. *Neurology* 2001;56:1015-1020.
- Campos-Sousa RN, Soares VY, Almeida KJ, et al. Knowledge of stroke among a Brazilian urban population. *Arq Neuropsiquiatr* 2007;65:587-591.
- Morgan LJ, Chambers R, Banerji J, Gater J, Jordan J. Consumers leading public consultation: the general public's knowledge of stroke. *Fam Pract* 2005;22:8-14.