



Popular stroke knowledge in Brazil: A multicenter survey during “World Stroke Day”



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ABSTRACT

Context and objective: Cerebrovascular disease is one of the most important causes of death and disability worldwide. The patient's inability to identify the warning signs of stroke substantially delays the search for emergency services, which is related directly to a worse outcome. Thus, during the 2011 Stroke Campaign in Brazil, a survey was conducted to identify the lay population's knowledge with regard to the recognition, treatment, and prevention of stroke.

Design and setting: This retrospective, cross-sectional, multicenter study was held in cities throughout southeastern Brazil.

Methods: The campaign was conducted by students of several medical schools under the guidance of neurologists (assistants and professors). The students traveled to various public areas in São Paulo, Campinas, Sorocaba, Taubaté, and Pouso Alegre, where information about stroke was distributed and a specific questionnaire was administered.

Results: A total of 1304 people answered the questionnaire: 43.9% claimed to know what a stroke was, 65% knew someone who has had the disease, 35% knew >3 risk factors for stroke, and 28.8% knew a preventive measure. Further, 17.9% was able to list at least 3 signs or symptoms of a stroke, 33.6% was aware that they should activate the emergency service, and 3.1% would have checked the time at which the signs and symptoms had developed.

Conclusion: Despite the severity of stroke, the population that we analyzed has a low level of knowledge. Campaigns should increase the lay population's understanding of this disease, thus improving its prevention and treatment and contributing to public health politics.

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1. Introduction

Cerebrovascular disease is one of the most important causes of death and is the leading cause of acquired handicaps in adults worldwide. According to the World Health Organization, 6.2 million people die from stroke each year [1]. In Brazil, the number of deaths due to stroke in 2013 was 100,050, making it the second leading cause of death [2].

According to the World Health Organization, the lay population must know how to identify and prevent stroke. Fast recognition could

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increase the likelihood of reaching emergency medical services (EMS) for effective treatment within a narrow therapeutic window. Long-term prevention of a widely preventable disorder is obtained more frequently when risk factors are identified and averted. Interventions that govern risk factors have garnered interest as a means of reducing the development of highly prevalent cardiovascular diseases [3,4]. In spite of its importance, such knowledge remains low in Brazil [5].

Prevention and specific treatment can be achieved when the population acquires information on disease prevention and how to seek the appropriate intervention. A patient's inability to identify the warning signs and symptoms of stroke and the long delays in seeking help from EMS are related directly to a worse prognosis for stroke events, because the time for treating them is compromised [6–9]. Studies in Brazil from 2004 to 2005 have shown that 22% of subjects do not know any signs of stroke and that approximately half of subjects would call EMS when encountering a patient with stroke symptoms [21].

To analyze the knowledge of the Brazilian lay population on stroke, medical students in 5 Brazilian cities took the initiative of promoting a *Stroke Campaign* according to the *World Stroke Campaign* on October 29, 2011—World Stroke Day—with the support of the Brazilian Stroke Society and Brazilian Academy of Neurology, interviewing the population about their knowledge, clarifying doubts, and teaching management of this condition to guide future stroke prevention measures [10].

2. Methods

This report describes the findings of a survey that was conducted during the 2011 World Stroke Day Campaign in Brazil. The campaign involved 118 medical students from 6 Brazilian medical schools in Sao Paulo, Campinas, Sorocaba, Taubaté, and Pouso Alegre. A questionnaire (Chart 1, Appendix 1) was developed with 4 questions that could be answered freely (open questions). One week before the campaign, students took several classes on stroke and enrolled in a standardized training program on approaching people, applying the questionnaire, explaining the correct answers, answering frequently asked questions.

Students were taught about the main risk factors, chief preventive measures, and principal signs and symptoms of stroke. To facilitate extraction of the results, the students had a list of the most likely responses (Chart 1).

We chose the terms “AVC” and “derrame” for the campaign, per the Brazilian Society of Cerebrovascular Diseases, although there are several terms for stroke in Brazil [11]. As shown in Chart 1, the signs and symptoms of stroke included paresthesia, weakness, mental confusion or aphasia, sight impairment, dizziness/loss of balance/loss of coordination, and intense headache.

The students were taught to classify headache as a stroke symptom only when it was described as a severe headache with sudden onset, which could be related to a subarachnoid hemorrhage. Also, students were told that participants often refer to aphasia as mental confusion. They considered the answers to be correct only when referring to speech difficulties. Students were advised that there were other possible correct responses that were not listed, such as dysphagia and diplopia, in which case, if they were unsure, they were instructed to record the responses by the subject and confirm them with doctors.

The answer to the question “Do you know how to act during suspicion of stroke?” was considered to be correct for such a response as “Check the clock and note the time of symptom/sign onset and seek EMS as soon as possible.”

During the day of the campaign, students were distributed equally throughout various high-flow locations, such as subways and train and bus stations, which were identified with illustrated campaign banners. Students, who wore t-shirts with the campaign logo to help identify themselves, approached passersby and invited them to participate. A campaign coordinator who had participated in drafting the questionnaire and training the volunteers accompanied each group.

The main objective of the campaign was to disseminate knowledge on stroke; the Brazilian campaign has a similar version of the acronym “FAST” (face drooping, arm weakness, speech difficulty, time to call 911) by the American Heart Association/American Stroke Association (AHA/ASA), which translates to “SAMU” in Portuguese (*sorria, abraça, música, urgente ligue 192*) [12,13]. Informative folders were distributed after the questionnaire was answered and properly explained. People who did not wish to be interviewed also received information and folders.

2.1. Data analysis

The data were analyzed using descriptive statistics. Demographics were categorized by gender, age (20–39, 40–59, 60–79, >79 years), and schooling (did not graduate from middle school, graduated from middle school, graduated from secondary school, university degree) and are expressed as percentages in Table 1.

The answers to questions on knowledge about stroke were marked in binary form (correct or incorrect) for all items and subitems of the questionnaire (Appendix 1). Also, a binary analysis was performed, categorized with regard to knowing >3 signs/symptoms of stroke, risk factors, and protective factors. The percentage of correct answers for each level of schooling was recorded.

3. Results

A total of 1304 people agreed to answer the Stroke Campaign Questionnaire; 91 questionnaires were excluded due to inappropriate age or incomplete information. In the final analysis, 1213 sets of answers were included; 658 participants (54.2%) were women, and 425 (35%) did not know someone who had suffered from a stroke. The mean age was 47.8 years (range 18 to 111 years). Additional demographics are shown in Table 1.

When asked about their knowledge of stroke (using 2 common popular denominations for stroke in Brazil: “AVC” and “derrame”), 35.1% of participants failed to define it correctly. This tendency decreased with higher educational level, from 59.3% in the less educated group to 17.0% in those who had studied beyond the high school level. In addition, in a stratified analysis, interviewees who knew someone who had suffered from a stroke had a lower rate of wrong responses (24.9%) than those who did not (54.1%).

With regard to questions about stroke and its risk factors, 17.9% was able to list at least 3 signs or symptoms of a stroke. Paresthesia was the most commonly mentioned symptom (33.7% of interviewees), followed by headache (27.8%), dizziness/lack of coordination/lack of balance (20.8%), weakness (20.1%), mental confusion/aphasia (19.2%), and sight impairment (10.6%).

Table 1
Demographics of the subjects compared with national data.

	N = 1213 (%)		State of Sao Paulo
Sex			
Male	555	45.8%	47.9%
Female	658	54.2%	52.1%
Age group, years			
20–39	370 ^a	30.5% ^a	35.7%
40–59	541	44.6%	25.6%
60–79	264	21.8%	6.5%
>79	18	1.5%	1.4%
Schooling			
Did not graduate from middle school	296	24.40%	41.9%
Graduated from middle school	91	7.50%	18.8%
Graduated from secondary school	520	42.87%	27.5%
University degree	306	25.23%	11.0%

^a Twenty people, aged 18 and 19 years, were removed from this sample analysis due to the unavailability of national data for comparison.

Hypertension was the most frequently cited risk factor (41.8%), followed by cigarette smoking and stress (25.8% each), obesity (25.5%), sedentary lifestyle (25.0%), dyslipidemia (22.6%), excessive alcohol consumption (20.4%), and diabetes mellitus (15.7%). Of all respondents, 35% listed at least 3 risk factors. In a stratified analysis by educational level, this rate rose to 42.2% in the more educated group, whereas in less educated subjects, it fell to 19.8%.

A total of 39.8% of respondents mentioned physical activity as a preventive measure, compared with 29% for obesity, 28.4% for controlling blood pressure, 23.7% for quitting cigarette smoking, 21.4% for regulating dyslipidemia, 18.3% for avoiding excessive alcohol consumption, and 12.8% for controlling glycemic levels. In total, 28.8% could name at least 3 preventive measures. In a stratified analysis by educational level, this rate was higher in the more educated (34.6%) versus less educated group (15.4%).

When participants were asked if they knew what to do when encountering someone who was suffering from a stroke, 33.6% claimed that they would seek EMS, 3.1% would check the time at which the signs and symptoms had initiated, and 6.6% would do both. Of those who reported to know someone who had suffered from a stroke, 49.2% knew what to do, in contrast to 32.2% of those who did not know anyone who has had a stroke. For more information about the questionnaire responses, see Tables 2–4 and Appendix 1.

4. Discussion

Due to the significance of vascular diseases worldwide and in Brazil, especially stroke, prevention and education interventions must be encouraged. An increase in the population's knowledge about such events can impact mortality and complication rates. Stroke is the second leading cause of death in Brazil [14]. As a potentially treatable condition with a limited therapeutic window, we rely on public awareness for its fast recognition and access to EMS. Medical entities have been investing in educational programs, achieving good results in controlling cardiovascular and neurovascular diseases. The National Health System, created in 1988, is a primary care program that, among its other objectives, gathers information on diseases to mitigate risk factors and consequently improve prevention rates [15,16].

Our survey revealed worrisome data on stroke awareness, concerning its prevention, recognition, and reaction. Notably, our convenient sample population had significantly higher education than the state's mean education level.

The average awareness of stroke in the population was not satisfactory. As shown by studies in developed countries [6], this awareness correlates positively with educational level (60.8% in more educated vs 22% in less educated subjects). The more educated subgroup had greater recognition of signs and symptoms (19.3% vs 9.9%), risk factors (42.2% vs 19.8%), and preventive measures (34.6% vs 15.4%). Similarly, they were more aware of the immediate steps that must be taken during a stroke, such as seeking EMS (47.1% vs 24.2%).

Table 2

Response to stroke knowledge questions: definition.

	Only "AVC"	Only "derrame"	Both	Neither
Schooling				
Did not graduate from middle school	5.5%	13.2%	22.0%	59.3%
Graduated from middle school	7.1%	15.5%	33.4%	43.9%
Graduated from secondary school	7.9%	11.7%	43.8%	36.5%
University degree	13.7%	8.5%	60.8%	17.0%
Know someone				
No	8.0%	11.3%	26.6%	54.1%
Yes	9.5%	12.3%	53.3%	24.9%
Total	9.0%	12.0%	43.9%	35.1%

Table 3

Response to stroke knowledge questions: reaction to stroke.

	EMS	Check time	Both	None
Schooling				
Did not graduate from middle school	24.2%	2.2%	4.4%	69.2%
Graduated from middle school	22.3%	6.8%	11.5%	59.5%
Graduated from secondary school	33.7%	2.7%	4.8%	58.8%
University degree	47.1%	0.7%	5.6%	46.7%
Know someone				
No	17.2%	7.5%	7.5%	67.8%
Yes	42.4%	0.8%	6.1%	50.8%
Total	33.6%	3.1%	6.6%	56.7%

EMS: emergency services.

Our data contrasted those of a Georgian study [17], in which, independent of schooling, 70% of the study group knew that they should activate EMS. Our survey showed that 3.1% of all participants knew the importance of determining the time of symptom onset; 24.9% and 50.8% of those who had experienced stroke-related situations could not define a stroke or list effective actions of management, respectively. Nonetheless, this subpopulation was more knowledgeable on the subject of stroke.

The scenario above may reflect the lack of government policies for education and training on medical emergencies and first aid. In a systematic review, Saver reported that the delay in accessing EMS was related directly to the progression of neuronal loss [18]. In addition, rapid access to EMS correlates with a greater likelihood of obtaining better treatments, such as thrombolysis. Thus, an investment in minimizing the delay in seeking EMS would substantially reduce the deaths, sequelae, and costs due to stroke [17,19,20].

A Brazilian study of 814 subjects by Pontes-Neto et al. in 5 major cities, including Sao Paulo, generated similar results regarding the general lack of information, in which, as in our study, less than half of the population would have called for EMS when facing a person who is experiencing a stroke. In contrast to our study, the most frequently cited risk factors were smoking (50.1%) and hypertension (30.1%) [21].

However, in comparing our risk factors with international data, our results were similar. Nordhorn et al. performed a population-based stroke knowledge assessment study, in which 28,090 questionnaires were administered to randomly selected residents of Berlin, noting hypertension as the most commonly referred stroke-related risk factor (43% of the population), as in our survey (41.8%) [22]. Other studies have reported that hypertension is the most important risk factor of stroke [21,23,24].

We also determined whether participants had knowledge on how to prevent stroke. Notably, most people cited regular physical activity (39.8%), whereas 28.4% suggested blood pressure control. According to the Stroke Council of the American Heart Association, risk factors can be defined as well-documented and modifiable (such as hypertension) and less well-documented or potentially modifiable (such as physical inactivity) [22]. Thus, although many people recognize that hypertension is an important risk factor, knowledge of the importance of its control still needs to be disseminated.

Table 4

Response to stroke knowledge questions: stroke awareness.

	≥3 sign/symptoms	≥3 risk factors	≥3 protective factors
Schooling			
Did not graduate from middle school	9.9%	19.8%	15.4%
Graduated from middle school	23.3%	30.4%	29.4%
Graduated from secondary school	15.4%	36.2%	27.3%
University degree	19.3%	42.2%	34.6%
Know someone			
No	16.9%	30.1%	22.4%
Yes	18.4%	37.7%	32.2%
Total	17.9%	35.0%	28.8%

Chart 1

English version of the questionnaire.

1. Do you know what a stroke (“AVC”) is?
2. Do you know what a stroke (“derrame”) is?
3. Can you indicate at least 3 signs or symptoms of a stroke?
4. Can you indicate stroke risk factors?
5. Do you know how to avoid a stroke?
6. Do you know how to act in a suspect of stroke?
7. Do you know somebody who has had a stroke?

4.1. Limitations

The main limitation of this study was its selection of a convenience sample, which might fail to be representative of the entire population of Sao Paulo, similar to previous studies [24]. As shown in Table 1, there was a selection bias, because the average age and education level differed from the state averages. In our sample, the subjects were older than the average for São Paulo state but younger than the population that is at risk for having an AVC, which is not necessarily a limitation, because the concept of stroke prevention should be taught to all ages. Because our sample comprised more educated people than the general population, our results could underestimate the true lack of stroke awareness. In addition, the symptoms mentioned by participants are not specific to stroke. Therefore, the correct answer does not necessarily mean that the participants would know how to identify a stroke. Another limitation is the lack of information about the percentage of people who refused to answer the questionnaire, and it is possible that the participants who agreed to answer the survey were those who were most interested in and had prior knowledge of stroke. Thus, further studies are warranted to confirm this hypothesis.

Conflicts of interest

None.

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Appendix 1. Stroke campaign questionnaire.

1. Age:
2. Gender:
F ___ M ___
3. Education Level:
4. Occupation:
5. Place of Interview: _____
6. Do you know what a stroke (“AVC”) is?
Right: ___ Wrong: ___
7. Do you know what a stroke (“derrame”) is?
Right: ___ Wrong: ___
8. Can you indicate at least 3 signs or symptoms of a stroke?
Paresthesia
Weakness
Mental confusion or aphasia
Sight impairment
Dizziness/Loss of balance/Loss of coordination
Intense headache
9. Can you indicate risk factors for a stroke?
Stress
Hypertension
Dyslipidemia
Smoking
Diabetes
Obesity
Excessive alcohol consumption
Lack of exercise
10. Do you know how to avoid a stroke?

Appendix 1 (continued)

- Physical activity
- Stop smoking
- Avoid obesity
- Dyslipidemia control
- Avoid excessive alcohol
- Blood pressure control
- Diabetes control
- 11. Do you know how to act when suffering a stroke?
Check the clock for the time of symptom/sign initiation
Look for emergency services as soon as possible
- 12. Do you know somebody who has had a stroke?
Yes: ___ No: ___

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