



Stroke symptoms, risk factors awareness and personal decision making in Chile. A national survey

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ABSTRACT

Background: Knowledge about stroke symptoms, correct decision in front of a stroke case and recognition of stroke risk factors are crucial to fight against stroke burden. We aimed to assess the stroke awareness among a sample of the Chilean population.

Methods: A closed-ended questions structured survey was applied in November 2019 using a computer-assisted telephone interviewing system. Probabilistic sample, random selection and stratification for region was used. Multivariate logistic regression model was used to estimate the association between participants' characteristics and responses.

Results: Of 706 participants, only 74.4% (95% CI 70.9-77.5) recognized at least one typical stroke symptom. Most (586, 82.4% 95% CI 75.2-89.7) chose to contact the emergency ambulance or directly go to the emergency department in case of a stroke symptom and recognized at least one risk factor (692, 97.9% CI 96.7-98.8). In multivariable analysis, sociodemographic characteristics associated to a worse recognition of at least one stroke symptom were being men (OR 0.67, 95% CI 0.47-0.96), being 55 years old or older (OR 0.59 95% CI 0.37-0.93) and from the lowest socioeconomic level (SES) (OR 0.33 95% CI 0.16-0.67). Female sex was associated with lower stroke risk factor knowledge (OR 0.64 95% IC 0.47-0.87). Participants who recognized at least one typical stroke symptom and would promptly seek care at an emergency department differed significantly between SES ($p=0.001$) and age groups ($p=0.035$).

Conclusions: We found insufficient knowledge about stroke symptoms and best decisions making in the Chilean population. We describe gaps that can be targeted in future stroke awareness campaigns. There is a need to strengthen tailored stroke education particularly for underserved populations.

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Introduction

Stroke is the second main cause of death and the first cause of acquired disability in the world.¹ Even though there is a slight decrease in its incidence, DALYs and mortality rates in Latin America since 1990, the absolute numbers are increasing due to rapid population aging. In 2019 e there were 30,704 discharges of a new or recurrent stroke and 7,989 deaths related to stroke becoming the second main specific cause of

death in Chile.²³ Reperfusion therapy rates are low in Latin America,^{4,5,6} with many possible barriers including inequity in accessing complex systems of care for stroke.⁷

Poor recognition of stroke symptoms delays access to emergency care and lowers the reperfusion rates leading to worse patient outcomes.⁸ Moreover, lack of knowledge within the community on how to access reperfusion therapies can also impact patients' treatment.⁹ Although during the last years there has been an increase on awareness campaigns and programs to identify and treat many known risk factors for stroke in Latin America,¹⁰ there is still lack of evidence about stroke knowledge in Chile. The aim of this study was to assess the recognition of typical stroke symptoms, risk factors awareness and the personal de-

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cision-making process within a stroke case in a national representative sample of Chile.

Methods

A cross-sectional study was conducted using a structured survey including socio-demographic data as age, gender, socioeconomic status, region of residence, and four multiple-choice closed-ended questions to evaluate the general knowledge about stroke: i) recognition of symptoms, ii) immediate response, iii) stroke risk factors, and iv) stroke consequences (Table 1). To create these questions, we used stroke symptoms considered in simple community screening scales,¹¹ other stroke awareness surveys previously applied in the Latin American con-

Table 1
Questions and alternatives of the survey.

Question	Option	Alternatives
1 With your knowledge and from the following list, which symptom would you consider that is presented by a person who is having or could have had a stroke?	Multiple choice	Chest pain Loss of consciousness Difficult to speak Headache Weakness of an arm or leg Asymmetry of the face Instability Nasal bleeding Double vision Dizziness Weakness of both legs Decreased vision None Do not know
2 What is the first thing you would do in front of a relative or other person who is having a stroke?	One answer	Call the centralized ambulance system (SAMU) or other ambulance service Go to an emergency department by own means Go to a basic primary care emergency service (SAPU) Schedule an appointment for a medical consultation Wait for the symptoms to resolve Call a private physician None Do not know
3 From the following, choose 3 factors you think could favor the occurrence of a stroke in a person	Multiple choice	Smoking Asthma High cholesterol Hypertension Diabetes Cardiac arrhythmia Stress Obesity Migraine Sedentarism Unhealthy diet Drinking alcohol excessively Heart illnesses None Do not know
4 What do you think is the most frequent health consequence of a stroke?	One answer	Death Disability None Other Do not know

SAMU: Medical emergency service (servicio de atención médica de urgencia); SAPU: primary care emergency service (servicio de atención primaria de urgencia)

text,^{6,8,9} known risk factors associated with acute stroke¹² and the potential consequences after a stroke. We also explored the actions that the respondent would choose in case of suspecting that someone had suffered a stroke. The questionnaire was applied in November 2019 by a specialized polling company (www.cadem.cl) using the Computer Assisted Telephone Interview system to pre and postpaid mobile phones, in a probabilistic sample obtained from large national database. The survey was anonymously answered by telephone and was directed to men and women 18 years old or older, living in urban and rural areas of all regions of the country. Age was stratified into 3 groups: between 18 and 34 years old, 35 and 54 years old, and age 55 or older, and this pre-specified age group strata was used for the analyses. The socioeconomic status (SES) index is an ordinal classification constructed using monthly income, principal occupation, and educational attainment of the household head.¹³ The SES groups in this sample were grouped in middle (upper-middle, middle and lower-middle), low and lowest groups according with local classification¹³; the upper SES group is small and was not represented in this sample.

Responses to question 2 were grouped: rapid presentation to an emergency department in case of stroke was considered if they answered any of the following: i) Call the centralized ambulance system or other ambulance service; ii) Go to an emergency department by own means.

The polling company used a probabilistic sample calculation stratified by region and with random selection of the participants. They have a weekly poll system that includes population ≥ 18 years old based on last national census information (2017, Chile total population ≥ 18 years old = 13,314,848), and calculate the sample size for each region with a 95% confidence interval. To reach this number of respondents considering previous experience of the polling company (20-25% response rate), 2,800-3,500 persons would have to be approached. Results are presented as percentages, mean (standard deviation) or median (IQR) as appropriate. The demographic characteristics were compared by stroke knowledge using Pearson χ^2 and Fisher's test. We assessed the association between participants' characteristics and stroke knowledge using logistic regression adjusting by age groups, gender, and SES.

All analyses were performed using Stata 14.0 and sampling weights were applied. The Scientific Ethics Committee of the Faculty of Medicine Universidad del Desarrollo Clínica Alemana de Santiago approved the protocol, and participants provided their verbal consent when contacted.

Results

3,362 persons were contacted in November 2019, and 706 (21%) answered the survey. The distribution of participants along the country was proportional to the regional population, with more people living in the metropolitan area. Demographic data of the population are presented in Table 2.

A total of 529 (74.4%, 95% CI 70.9-77.5) participants recognized at least one typical stroke symptom (speech difficulty, weakness of one arm or leg and face drooping) but only 48 (6.6%, 95% CI 5-8.7) recognized the 3 symptoms of the FAST scale altogether. Although headache was the most frequently selected symptom (312, 44.2%, 95% CI 40.6-47.9), it was followed by the following correct answers: i) speech difficulty (309, 43.8%, 95% CI 40.2-47.5), ii) weakness of one arm or leg (269, 38.1%, 95% CI 34.6-41.7) and iii) face drooping (258, 36.5%, 95% CI 33-40.2). (Fig. 1)

Most participants (586, 82.4%, 95% CI 75.2-89.7) chose to go directly to the hospital emergency care or contact the mobile emergency service or another ambulance service in case of a suspected stroke.

Regarding stroke prevention, most participants recognized at least one risk factor (692, 97.9% 95% CI 96.7-98.8) and more than half referred to 3 correct risk factors (398, 56.4% 95% CI 52.7-60.0). The most

Table 2
Participant characteristics.

	N (706)
Sex	
Female	354 (50.1%)
Age	
Mean (SD)	42.0 (15.5)
18 - 34	273 (38.7%)
35 - 54	270 (38.2%)
55 +	163 (23.1%)
Region of residency	
Capital region	298
Other regions	408
Socioeconomic status	
Upper-middle	109 (15.4%)
Middle	186 (26.3%)
Lower-middle	167 (23.7%)
Low	182 (25.8%)
Lowest	62 (8.8%)

recognized stroke risk factor was hypertension (41.8 95% CI 38.2-45.5), followed by stress (38.5% 95% CI 35.0-42.2), smoking (38.1% 95% CI 34.6-41.7), sedentarism (33.6% 95% CI 30.2-37.1), obesity (32.9% 95% CI 29.5-36.4), and high cholesterol (31.6% 95% CI 28.3-35.1). Men detected smoking more frequently as a stroke risk factor compared to women (44.7% vs 32.6% $p=0.002$). (Fig. 1) Regarding stroke consequences, disability was identified by 66% (95% CI 62.0-69.0) of participants and death by 29% (95% CI 25.5-32.2).

In multivariable analysis, participant characteristics associated to a less recognition of at least one stroke symptom were being men (OR 0.67, 95% CI 0.47-0.96), being 55 years old or older (OR 0.59 95% CI 0.37-0.93) compared to the younger group and being in the lowest SES (OR 0.33 95% CI 0.16-0.67) compared to the wealthier group. Female sex was associated with lower stroke risk factor knowledge (OR 0.64 95% IC 0.47-0.87). No associations were found by age groups or socioeconomic status regarding risk factor knowledge.

No significant associations were detected when action in case of suspected acute stroke was analyzed or regarding stroke consequences.

Participants who recognized at least one typical stroke symptom and answered that they would promptly attend an emergency service in case of stroke were 180/273 (66%, 95% IC 60.1-71.3) from the 18-34 years old group; 172/270 (64%, 95% IC 57.8-69.2) from the 35-54 years old; and 85/163 (52%, 95% IC 44.5-59.7) from the 55 years old or older. Regarding SES group distribution, 82/109 (75%, 95% CI 66-82) were in the upper middle SES, 112/186 (60%, 95% CI 53-67) in the middle SES, 115/182 (63%, 95% CI 56-70) in the lower-middle SES, 103/167 (62%, 95% CI 54-69) in the lower SES and 25/62 (40%, 95% CI 29-53) in the lowest SES. The combination of recognizing at least one typical stroke symptom and answering that they would promptly attend an emergency service in case of stroke was independently associated to age ($p=0.035$) and SES ($p=0.001$), being less frequent in older participants when compared to the younger group (OR=0.58, 95% CI 0.38-0.88) and being from middle, lower-middle, low and lowest SES group compared to the upper-middle SES (OR=0.50 95%CI 0.29-0.86; OR=0.56 95%CI 0.33-0.97; OR=0.56 95%CI 0.32-0.97; OR=0.23 95%CI 0.11-0.45, respectively).

Discussion

This national Chilean survey addressing stroke knowledge/awareness shows that almost 25% of participants did not recognize at least one typical symptom of stroke. Although most people would rapidly attend an emergency service in case of stroke, the percentage of those who recognize at least one stroke symptom and would promptly go to the emergency differs largely between age and SES groups, revealing an important disadvantage in the older and lowest SES segment.

The identification of sociodemographic characteristics associated to worse recognition of typical stroke symptoms can help focusing local knowledge campaigns. Men, older people and lower SES are a stroke education challenge in Chile. Our results regarding correct recognition of at least one symptom of the FAST scale were similar to previous reports from Brazil and Cincinnati.⁹⁽¹⁴⁾ Headache was the most frequently selected symptom, showing the importance that our population gives to pain, which could be explained by cultural factors. Like in other reports, most participants chose to contact the emergency ambulance or directly go to the emergency care in case of a recognized stroke,^{9,15} and rapid consultation was particularly frequent in participants younger than 35 years. Regarding stroke prevention, the most recognized stroke risk factor was hypertension, similar to that found in studies from Japan and Argentina.^{16,17} The low percentage of women who recognized smoking as a risk factor is striking in our report. Stress is in second place as a recognized risk factor in our study, in Argentina it was only reported by 20%.¹⁷

In general, determinants of health-care utilization are: i) need for care, ii) knowledge of care needed, iii) willingness to obtain care, iv) care access.¹⁸ This is a complex combination of factors related to the population and the health system. When applied to stroke, stroke recognition and correct predisposition to seek stroke care are relevant to appropriate health-care utilization. The combination of lack of stroke symptoms recognition associated with a lack of rapid presentation to an emergency service is a crucial barrier to accessing appropriate stroke care. This is of particular importance in the lowest SES population since they are the most affected by acute cardiovascular diseases whether in rural or urban areas.¹⁹⁻²¹ Although stroke knowledge should be reinforced in all SES segments, tailoring the campaigns to have better impact in the different social strata is paramount. Different focused stroke campaigns are currently available. For example, the World Stroke Association has focused its educational multi language campaign on the younger age group - who can be stroke patient bystanders - to raise awareness of stroke symptoms and the need for speedy action (<https://fasteroes.com>). Nevertheless, this campaign and other similar are not widespread in Latin-American or Chile and are urgently needed. The population's ability to recognize stroke symptoms is vital to successful stroke care and guidelines emphasize the importance of teaching the public about the warning symptoms of stroke.²²

This data provides useful information when designing future educational campaigns to the population. To our knowledge, this is the first published population-based stroke awareness survey in Chile. Its main strength is the use of a telephone-based survey using the network of an agency allowed us to obtain a national representative sample.

This study has some limitations. Our data were generated from closed-ended questions, an approach that can result in higher estimates of stroke knowledge compared with open-ended questions. We report only the knowledge of respondents. Thus, we cannot rule out a bias toward different knowledge in this group if compared with non-respondents. Other relevant determinants of health-care utilization were not explored.

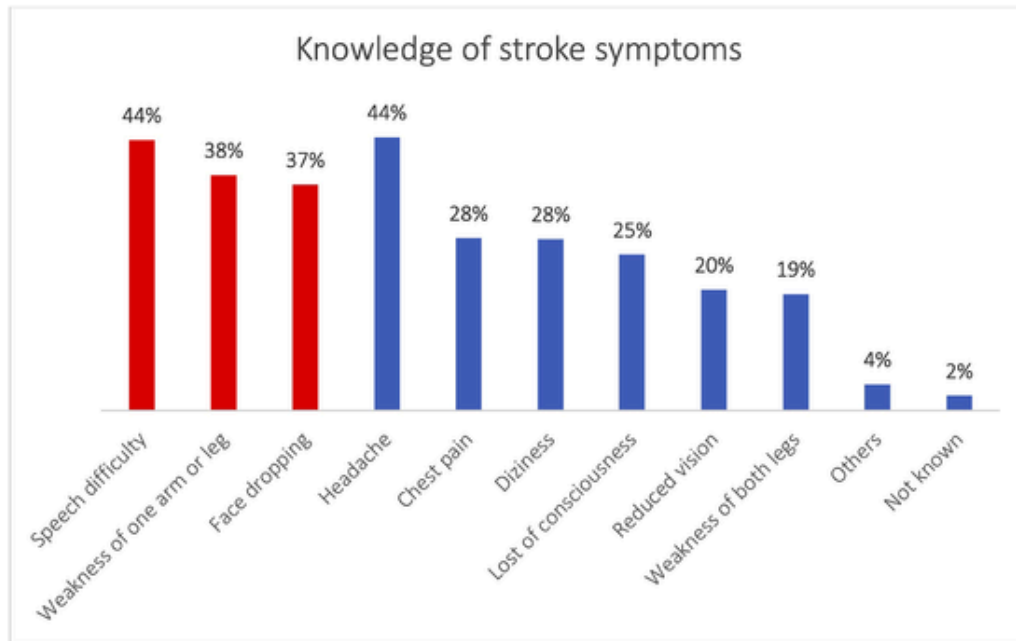
Although the response rate was in the lower expected range for this method,²³ simultaneous development of Chilean protests and social uprising throughout the country since October 2019 could have affected the survey cooperation and completion.²⁴

Despite its limitations, our study provides robust data from a large and representative sample of the Chilean population and can reflect a proper estimate of current stroke awareness in our country.

Conclusions

We observed that almost a quarter of Chileans did not recognize at least one typical symptom of stroke although there is a good recognition of risk factors. There is a need for tailored educational campaigns especially to men, older age persons and in lower SES groups. Our study

A



B

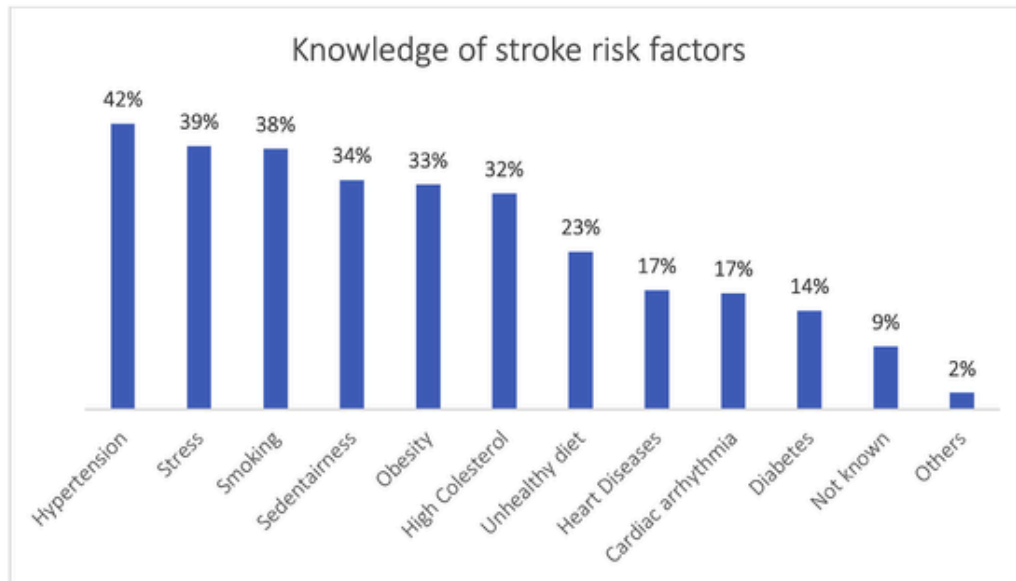


Fig. 1. Summary of responses to the survey questions 1 and 3. A: percentage of answers given to the knowledge of stroke symptoms question. B: percentage of answers given to the knowledge of stroke risk factors question.

provides useful information to better understand aspects of stroke recognition in the Chilean population and to target stroke education campaigns.

Authors` contribution

The authors confirm contribution to the paper as follows: study conception, design and data collection: VN, EM; analysis and interpretation of results: LH; draft manuscript preparation: VN, EM, PMV. All authors reviewed the results and approved the final version of the manuscript.

Uncited references

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Declarations of interest

None.

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