



# Prevalence of frailty and associated factors in old people after cerebrovascular accident

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## Abstract

**Objective:** to assess the prevalence of frailty and associated factors in old people affected by cerebrovascular accident (CVA) **Method:** a cross-sectional study with patients aged 60 years or older assisted in a neurology outpatient clinic. Data were collected by a questionnaire containing sociodemographic, clinical, lifestyle, and assistance data in the rehabilitation area, and by the Mini-Mental State Examination and Edmonton Frail Scale. **Results:** The study population comprised 69 old people with an average age of 72 ( $\pm 7.4$ ) years. Among the frail patients were the longest-lived individuals (90.9%), females (92.3%), with marital status representing having had a partner at some point in life (separated, divorced, or widowed - 94.4%), those who did not live alone (80.3%), with no education (80.6%) and income (100%), and self-declared to be black (100%) or spiritist (100%). Most did not present any comorbidities nor harmful lifestyle habits, except for systemic arterial hypertension. There was also low assistance in the rehabilitation area. The MMSE assessment indicated altered mental status for 83.7% of frail old people. Significant associations were found between frailty and marital status ( $p=0.042$ ), with the presence of diabetes *mellitus* ( $p=0.002$ ), and absence of acute myocardial infarction ( $p=0.030$ ). **Conclusion:** We suggest further studies to follow this type of population affected by CVA from hospitalization to rehabilitation discharge to clarify the process of functional and cognitive decline and its relation with frailty.

**Keywords:** Health of the Elderly. Frailty. Stroke.

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## INTRODUCTION

Considering the complexity of the changes influencing the aging process, the variation in physical and cognitive function should be analyzed in addition to changes in chronological age. In fact, old people are more likely to experience multiple, coexisting, and interrelated problems which are often seen due to the presence of broader geriatric syndromes such as frailty and impaired cognition, or the loss of functionality<sup>1</sup>. An effective gerontological assessment associated with coordinated care shows that functional assessments of these syndromes are better predictors of survival than the presence or number of specific diseases<sup>1</sup>.

One of the challenges of the health system with the aging of the population is to adjust the services offered aiming at the quality of life of the old population. However, with the increase in Chronic Non-Communicable Diseases (NCDs) there will be an overload on health services mainly affecting low-income populations as they are more vulnerable, more exposed to risks, and have less access to health promotion and disease prevention services and practices, resulting in devastating consequences for individuals, families, and communities<sup>2</sup>. Among NCDs, cardiovascular diseases (CVDs) represent the main cause of death in Brazil and the world, corresponding to one-third of the total deaths and for this reason, they are considered a serious public health problem<sup>3,4</sup>. CVDs present several risk factors including aging<sup>3</sup>.

Research carried out in the USA and Europe pointed out a significant relationship between the components of frailty and the onset of cerebrovascular diseases with repercussions on the survival and recovery after the episode due to impaired functional performance, as well as the scarcity of prevention and rehabilitation programs for the most affected frailty components in this population<sup>5,6</sup>.

Frailty is a common and important geriatric syndrome conceptually defined as a clinically recognizable condition in older adults, with increased vulnerability to adverse health events resulting from age-associated declines in the physiological

reserve and function of multiple organ systems<sup>7</sup>. Also, frailty would be based on the tripod of the different alterations related to the aging process consisting of sarcopenia, immune dysfunction, and neuroendocrine dysregulation<sup>8</sup>.

From the observation that frailty and pre-frailty are common in people with CVD, the need to identify and evaluate this syndrome in the cerebrovascular accident (CVA) survivors was pointed out, and how the possible clinical implications can affect the prognosis<sup>9</sup> since CVA is among the four diseases that most contributed to hospitalizations - including diabetes and hypertension -, and is part of the Brazilian list of hospitalizations that can be avoided with effective actions at other levels of care<sup>10</sup>.

Considering the aging process of the population, increased NCDs with emphasis on CVDs, in particular CVA and their relationship with frailty in old people, we suggested research aimed at the frailty syndrome and associated factors to optimize health policies and actions in Brazil and the specificities of its old population. In this sense, we intended to assess the prevalence of frailty and associated factors in old people affected by CVA.

## METHOD

This is a cross-sectional observational and quantitative study carried out in an outpatient clinic of a state referral hospital in neurology located in the Metropolitan Region of Recife, Pernambuco. The study sample was non-probabilistic, being obtained by signaling users and family members who confirmed to be within the desired profile in an initial interview since the service was not specific to the desired outcome.

In 2019, 69 patients who met the inclusion criteria (age equal to or greater than 60 years, diagnosis of CVA, and being assisted in this service) were evaluated for approximately five months. Those who had severe cognitive impairment or commitment to communication along with the absence of an informant were excluded, as it was impossible to obtain the responses to the questions presented in the questionnaire and scales described below.

The questionnaire was applied to the old people and their caregivers and included sociodemographic, clinical, lifestyle data as well as on rehabilitation care. It comprised the questions on age, gender, marital status, whether living together, education, occupation, bond with a social security institution, income, self-reported skin color, religion, presence of comorbidities such as acute myocardial infarction, systemic arterial hypertension, diabetes mellitus, alcoholism or smoking, and rehabilitation care by Physiotherapy, Speech Therapy, and Occupational Therapy.

One of the instruments used was the Mini-Mental State Examination (MMSE) aimed at assessing the mental status, more specifically for dementia symptoms. The following cutoff points were used to investigate the presence of cognitive impairment: 13 points for illiterate old people, 18 points for those with low and medium education (up to eight years of studies), and 26 points for old people with high education (above eight years of studies)<sup>11</sup>.

Lastly, the Edmonton Frail Scale (EFS) aimed at assessing frailty in old people was used, translated, and validated in Brazil. Said scale comprises the nine domains of cognition, general health, functional independence, social support, medication use, nutrition, mood, continence, and functional performance investigated by 11 items. The maximum score is 17, and it represents the highest level of frailty. The scores for the analysis of frailty are 0-4 representing no frailty, 5-6 apparently vulnerable, 7-8 mild frailty, 9-10 moderate frailty, 11 or more severe frailty<sup>12</sup>.

For data analysis, a database was created on the Microsoft Excel spreadsheet and was exported to a statistical software where it was analyzed. The percentage frequencies were calculated to characterize the profile with the questionnaire information, and the respective frequency distributions were built. To compare the percentages found in the levels of the evaluated factors, the chi-square test was applied to compare proportions.

The contingency tables were created to assess which factors influenced the EFS classification, and the chi-square test for independence was applied. The

Fisher's Exact test was applied for the cases where the assumptions of the test were violated. The Poisson multivariate model with robust variance was adjusted to assess which factors jointly influenced the patient's level of frailty. Variables with statistical significance of up to 20% (0.2) in the bivariate analysis were included in the initial model. The significance level of 5% was considered in the Wald test for the permanence of the variables in the model. Also, the prevalence ratios were calculated to compare the risk of frailty in groups of patients with a higher risk profile for this syndrome.

The research was carried out following the ethical procedures recommended by Resolution 466/12 of Conselho Nacional de Saúde (CNS - the Brazilian National Health Council) and approved by the Human Research Ethics Committee of Instituto de Medicina Integral Professor Fernando Figueira (IMIP) under Opinion No. 3,196,109. The participants were previously informed about the research objectives, the possible implications of their participation, and when they agreed to participate in the study they signed the ICF.

## RESULTS

The study population comprised 69 old people with an average age of 72 ( $\pm 7.4$ ) ranging from 60 to 86 years who were assisted in a neurology outpatient clinic due to a cerebrovascular accident (CVA). A profile was found in which 43.5% of the individuals were between 70 and 79 years old ( $n = 30$ ), 62.3% were male ( $n = 43$ ), 52.2% were married or in a common-law marriage ( $n = 36$ ), 95.7% lived with a roommate ( $n = 66$ ), 53.7% had not completed any year of regular education ( $n = 36$ ). Although 81.2% of the individuals claimed to have had an occupation at a productive age ( $n = 56$ ), retirement represented the main source of income only for 62.3% of these old people ( $n = 38$ ), and this income was restricted to one minimum wage to 81.8% ( $n = 54$ ) represented by R\$998.00 (nine hundred and ninety-eight Brazilian reais) in force in 2019. Besides, 63.8% of these old people self-declared to have brown skin color ( $n = 44$ ), and 69.3% were Catholic ( $n = 45$ ).

Table 1 shows the distribution of the EFS classification according to the sociodemographic profile of old patients. There is a higher prevalence of frailty in the group of female patients aged 80 years or older with marital status representing having had a partner at some point in life, who lived with a roommate, no education, who had no occupation, with other links with the social security institution, which had no income, who self-declared to be black and from a spiritism religion. However, the only aspect described presenting a significant result in the independence test was related to the gender of the patients.

Table 2 shows the distribution of the EFS classification according to the comorbidities and habits of the patients evaluated where there was a higher prevalence of frailty in the group of patients without acute myocardial infarction (AMI), the presence of systemic arterial hypertension (SAH), and diabetes mellitus (DM), and in the absence of alcoholism and smoking. Even though a higher prevalence of frailty was found in the group of patients with the profile described, the independence test was significant only for AMI and DM indicating that these factors significantly change the level of the EFS classification.

The distribution of the EFS classification according to rehabilitation care is in table 3 and shows a higher prevalence of frailty in the group of patients who were not followed by physiotherapy, speech therapy, or occupational therapy. However, even though a higher prevalence of frailty was found for patients who did not have any rehabilitation care,

the independence test was not significant for the factors evaluated indicating that follow-up is not decisive for a better EFS classification.

The bottom part of Table 3 shows the distribution of the EFS classification according to the MMSE classification in which there is a higher prevalence of frailty in the group of patients with altered mental status. Even though a difference was observed in the percentage of the worst classification of frailty in the groups described, the examination by the independence test was not significant indicating that the MMSE classification is not decisive for the EFS classification.

Finally, the Poisson multivariate model for patient frailty is shown in table 4. For the multivariate analysis, variables with statistical significance less than 0.2 were included in the multivariate analysis: gender, marital status, type of connection with the INSS, AMI, speech therapy, and MMSE observed score. In the final adjustment of the model, the variables presenting statistical significance of up to 0.05 were the marital status ( $p$ -value = 0.042), AMI ( $p$ -value = 0.030), and DM ( $p$ -value = 0.002). The groups of single and separated/divorced/widow/ed patients had a higher risk of frailty with 18% and 35%, respectively, when compared to the group of married/in common-law marriage patients. However, there is an increased risk of frailty in patients who did not have AMI (74%) when compared to the group of patients who already had AMI. In the presence of DM, there was a 37% increase in the risk of frailty when compared to the group of patients without DM.

**Table 1.** Distribution of the EFS classification according to the sociodemographic profile of old people affected by CVA treated at a neurology outpatient clinic. Recife, Pernambuco, 2019.

	EFS classification		p-value
	Frail	No frailty	
Age (years)			0.538*
60 to 69	21 (75.0%)	7 (25.0%)	
70 to 79	24 (80.0%)	6 (20.0%)	
80 or more	10 (90.9%)	1 (9.1%)	
Gender			0.043*
Male	31 (72.1%)	12 (27.9%)	
Female	24 (92.3%)	2 (7.7%)	
Marital status			0.082**
Single	13 (86.7%)	2 (13.3%)	
Married/common-law marriage	25 (69.4%)	11 (30.6%)	
Separated/divorced/widow/ed	17 (94.4%)	1 (5.6%)	
Lives with a roommate			0.499**
Yes	53 (80.3%)	13 (19.7%)	
No	2 (66.7%)	1 (33.3%)	
Education (complete years)			0.845**
None	29 (80.6%)	7 (19.4%)	
1 to 8 years	16 (80.0%)	4 (20.0%)	
More than 8 years	8 (72.7%)	3 (27.3%)	
Occupation			0.278**
Has an occupation	43 (76.8%)	13 (23.2%)	
Has no occupation	12 (92.3%)	1 (7.7%)	
Link with the INSS (social security institution)			0.059**
Retirement	27 (71.1%)	11 (28.9%)	
Continuing Benefit Conveyance	11 (91.7%)	1 (8.3%)	
Others (eg pension)	11 (100.0%)	0 (0.0%)	
Income (in minimum wages)			0.420**
None	6 (100.0%)	0 (0.0%)	
1 MW	43 (79.6%)	11 (20.4%)	
2 MW or more	4 (66.7%)	2 (33.3%)	
Skin color			0.631**
White	15 (75.0%)	5 (25.0%)	
Black	5 (100.0%)	0 (0.0%)	
Brown	35 (79.5%)	9 (20.5%)	
Religion			0.450**
Catholicism	34 (75.6%)	11 (24.4%)	
Evangelical	17 (89.5%)	2 (10.5%)	
Spiritism	1 (100.0%)	0 (0.0%)	

\*p-value of the chi-square test for independence; \*\*p-value of the Fisher's exact test; EFS = Edmonton Frail Scale; CVA = cerebrovascular accident; BPC = Continuing Benefit Conveyance.

**Table 2.** Distribution of the EFS classification according to the comorbidities and lifestyle habits of old people affected by CVA treated at a neurology outpatient clinic. Recife, Pernambuco, 2019.

	EFS classification		p-value*
	Frail	No frailty	
Acute Myocardial Infarction			
Present	6 (50.0%)	6 (50.0%)	0.011**
Absent	49 (86.0%)	8 (14.0%)	
Systemic Arterial Hypertension			
Present	45 (81.8%)	10 (18.2%)	0.460**
Absent	10 (71.4%)	4 (28.6%)	
Diabetes mellitus			
Present	26 (92.9%)	2 (7.1%)	0.025*
Absent	29 (70.7%)	12 (29.3%)	
Alcohol use			
Present	19 (76.0%)	6 (24.0%)	0.564*
Absent	36 (81.8%)	8 (18.2%)	
Smoking			
Present	26 (78.8%)	7 (21.2%)	0.855*
Absent	29 (80.6%)	7 (19.4%)	

\*p-value of the chi-square test for independence; \*\*p-value of the Fisher's exact test; EFS = Edmonton Frail Scale; CVA = cerebrovascular accident.

**Table 3.** Distribution of the EFS classification according to the rehabilitation care and the MMSE classification in old people affected by CVA assisted in a neurology outpatient clinic Recife, Pernambuco, 2019.

	EFS classification		p-value
	Frail	No frailty	
Physiotherapy			
Yes	26 (74.3%)	9 (25.7%)	0.256*
No	29 (85.3%)	5 (14.7%)	
Speech Therapy			
Yes	10 (66.7%)	5 (33.3%)	0.167**
No	45 (83.3%)	9 (16.7%)	
Occupational therapy			
Yes	5 (71.4%)	2 (28.6%)	0.624**
No	50 (80.6%)	12 (19.4%)	
MMSE Classification			
Normal mental status	14 (70.0%)	6 (30.0%)	0.208**
Altered mental status	41 (83.7%)	8 (16.3%)	

\*p-value of the chi-square test for independence; \*\*p-value of the Fisher's exact test; EFS = Edmonton Frail Scale; MMSE = Mini-Mental State Examination; CVA = Cerebrovascular Accident.

**Table 4.** Adjustment of the Poisson's multivariate model for EFS frailty in old people with CVA treated in a neurology outpatient clinic. Recife, Pernambuco, 2019.

	PR	CI (95%)	p-value*
Marital status			
Single	1.18	0.90 - 1.53	0.226
Married/common-law marriage	1.00	-	-
Separated/divorced/widow/ed	1.35	1.07 - 1.70	0.012
Acute Myocardial Infarction			
Present	1.00	-	-
Absent	1.74	1.05 - 2.89	0.030
Diabetes mellitus;			
Present	1.37	1.12 - 1.68	0.002
Absent	1.00	-	-

EFS = Edmonton Frail Scale; CVA = Cerebrovascular Accident; PR = Prevalence Ratio; CI = Confidence interval; \*p-value of the Wald test.

## DISCUSSION

The old population affected by CVA in the present study egressed from a state referral hospital in neurology was mostly represented by young old men, married or who had a partner, with no education, retired, and with an income of up to one minimum wage. These results are similar to the aspects found by researchers from São Paulo for an old population after hospital discharge, where the average age was 71.2 years ( $\pm$  8.4) with a higher prevalence of males, married, but with education from 1 to 4 years completed in regular education<sup>13</sup>.

Similar data can be found outside the hospital, as in the research by Damata et. al.<sup>14</sup> in Piauí related to specialized care in a rehabilitation service in which it was observed that this is the user profile remaining in the healthcare service after a CVA.

It is observed that, as in the present research, in most of the aforementioned studies, it is the old male with a partner who constitutes the public treated in healthcare services focused on this condition, reflecting that their marital status would serve as support for the maintenance of this care, considering the construction of the task of caring as a female role<sup>14</sup>. In this sense, publications aimed at old people caregivers in this profile point to a predominance of females, whether in the family, formal or informal

in the care work, which consequently may be related to the care directed to the male public<sup>15,16,17</sup>.

Even so, regarding the influence of family arrangements and income on the old population considering the presence of a roommate and the precarious economic situation found in the present study, the role of this caregiver in the face of the situation where old people are breadwinners is questioned, as a deliberation not only of the old people and their family but as a reflection of historical, sociocultural, political, economic, and demographic factors in the provision of care<sup>18</sup>.

According to Paulo, Wajnman, and Hermeto<sup>19</sup>, "the health of the old person and their age are of great importance in determining their home composition", since the age group and health conditions would be predictors of the accumulation of disabilities and consequent dependence on third parties. Besides, while there are a lower survival rate and a higher probability of new family formation or marriage for men, in the case of widowhood or divorce, old women tend to establish single-person households and their financial autonomy.

In this sense, the most prevalent characteristics related to gender and family ties of old people who had a CVA and are associated with frailty were being female, not having a partner (even if they lived alone),

having low education, receiving income equal or less than one minimum wage, and not being white. To corroborate these findings, Bushnell<sup>20</sup> refers to gender and skin color pointing to a higher prevalence of frailty in women than in men, in addition to the high vulnerability among African-American women. However, these results differ from those found in a survey carried out in China in which old women were considered less prone to decline in terms of frailty status than men<sup>21</sup>.

Regarding comorbidities, although the general prevalence of SAH was emphasized in the absence of the other conditions analyzed for AMI and DM as well as the lifestyle habits of alcoholism and smoking in the population studied, concerning frailty, the risk factors considered were the absence of previous AMI and the presence of DM.

Regarding the absence of AMI as a factor related to the increased risk of frailty in old people with CVA, a longitudinal study carried out with an old population in the Netherlands also found no significant association between CVD, AMI, and frailty. However, it emphasized other conditions such as peripheral arterial disease and heart failure, which would make these subjects more likely to be frail, while in an inverse association analysis frailty would not precede the development of CVD<sup>22</sup>. In addition to the above, as it represents a greater risk for long-lived old people in events related to AMI, studies suggest the assessment of frailty as a prognostic factor in the treatment of this population<sup>23</sup>.

Regarding diabetes, although absent in the majority of the population studied, it presented a high percentage in individuals classified as frail and was configured as a risk factor in the development of this condition. Corroborating this finding, Scherthaner and Scherthaner-Reiter<sup>24</sup> point out that diabetes is associated with frailty, dementia, and cognitive impairment, in addition to having a direct relationship with the increase in comorbidities such as myocardial infarction, cerebrovascular accident, peripheral arterial disease, and kidney failure, compared to non-diabetic old people.

In this sense, while frailty depends on the deterioration of muscle and nerve function with a subsequent decrease in the cardiopulmonary reserve

and loss of executive function, DM often causes functional impairment in each of the aforementioned systems, leading to a loss of homeostasis of the whole body and the deterioration of the physical function<sup>25</sup>. Therefore, knowledge of these concomitant clinical conditions - CVA and diabetes - influences the therapeutic approach to be followed since a less rigorous objective must be adopted for frail old people, as well as those with cognitive decline<sup>26</sup>.

As for alcohol and smoking habits, there was a higher prevalence in the absence of these two habits in the population studied, although the number of smokers and non-smokers was similar. In a national study, Noronha et. al.<sup>27</sup> found a pattern close to that observed in other populations in which old people reporting heart diseases, CVA, and DM consumed less alcohol. The suggested relation was that the subjects affected by these diseases were less likely to drink due to possible negative interactions with medications as well as because they had more frequent medical monitoring for these chronic conditions.

However, even though there is a decline in the prevalence of smokers with increased age possibly related to the emergence of actions to explain the onset of problems due to the non-cessation of cigarette consumption, the greater probability of early death of smokers, and the growing concern about health with the adoption of healthier behaviors, the prevalence in old people with serious diseases including CVA remains high<sup>28</sup>.

In the assessment of cognitive deficit by the MMSE, there was a higher frequency of altered mental status among the group of old people with frailty, even though the statistical analysis did not show significance between cognitive performance and the presence of frailty. This suggests that individuals affected by CVA may have cognitive impairment and frailty, which although simultaneously present may not be related to each other considering the characteristics of each condition.

Mijajlović et. al.<sup>29</sup> point out that CVA survivors have a higher risk of developing cognitive deficits, as well as losses of executive functions, functional performance, and quality of life. And that despite the availability of information on the subject, conflicting results are observed between the cognitive effect after

a CVA event and the cognitive decline associated with age and vascular risk factors. That is why physical disabilities tend to improve after a CVA, while cognitive deficits progressively worsen for reasons that remain unknown.

Another concept proposed by the International Consensus Group of the International Academy on Nutrition and Aging and the International Association of Gerontology and Geriatrics based on epidemiological findings related to cognitive fragility and deterioration is that “cognitive fragility” is defined by the simultaneous presence of physical frailty and cognitive impairment in old people without a clear diagnosis of dementia. Another characteristic of this cognitive frailty would be its reversibility, making it the target of actions to prevent neurodegenerative processes<sup>30</sup>.

In this context, physical frailty could then be associated with cognitive impairment at the end of life, and with the presence of other comorbidities such as dementia, including Alzheimer’s disease, mild cognitive impairment, and vascular dementia<sup>30</sup>.

Even though no significant results were obtained regarding the influence of the type of care provided in the rehabilitation area among frail and non-frail old people, it was observed that the majority of old people treated was in the group of those considered frail. Physiotherapy was the area with the highest prevalence of users treated, while speech therapy and occupational therapy reached, respectively, only one-fifth and one-tenth of the population assisted.

This suggests an emphasis on the motor sequelae of CVA when compared to the aspects related to functional independence, cognition, and language that may also be affected. In the present study, for example, most of the old people had some cognitive deficit considering the educational criteria in the assessment by the MMSE. Another factor related to reduced care in some areas may be the provision of these services in healthcare services. In the case of the hospital where the collection took place, after hospital discharge, the only service offered among those mentioned above was physiotherapy, and users should look for other places of care according to their needs.

A survey carried out in Espírito Santo showed a high prevalence of functional disability in old people after CVA with the association with advanced age, self-perceived limitations in body functions, and accessibility to public roads, reiterating the need for measures to monitor the functional capacity and promote support to this population<sup>31</sup>. In other words, the CVA condition is already debilitating, and could be worsened by aspects related to frailty and difficulty in accessing services, but which are not always the target of health interventions.

A multicenter study with users treated at home pointed out that the vast majority of prognostic factors reported in the literature as related to the discharge of CVA patients after rehabilitation was not correlated to the discharge of frail and multimorbid old people admitted to geriatric rehabilitation<sup>32</sup>. This same study showed that a higher level of independence in activities of daily living, when compared to the moment of admission to geriatric rehabilitation, would be associated with discharge after 6 months from the beginning of CVA rehabilitation, emphasizing the importance of data on frailty and social support during this process<sup>32</sup>.

In general, a high prevalence of frailty is observed in old people after CVA with different factors associated with characteristics specific to the socio-economic situation of the populations where these old people are inserted. In the present study, the associations were related to marital status and some comorbidities such as AMI and DM, considering that a percentage of almost 80% of old people interviewed were frail. In China, there was a 67.6% prevalence of frailty among old people living in the community associated with age, ethnicity, family, number of children, income, diet, and exercise<sup>33</sup>. Another study carried out in Portugal showed a 60% prevalence of frailty among old people in the community, but with an association with vision problems, fear of falling, hospitalizations in the last year, use of mobility devices, and perception of health status<sup>5</sup>.

For this reason, Zhang et. al.<sup>33</sup> advise that a comprehensive health management model be implemented for prevention and multidimensional intervention in the frail population. For Farooqi et. al.<sup>34</sup>, despite advances in the prevention and

treatment of CVD, frail patients represent an important subgroup that remains at high risk for adverse cardiovascular events and CVD-related death. Therefore, the assessment of frailty could increase the prognosis when added to traditional CVD risk measures and assist in the identification of people with established risk factors<sup>33</sup>.

Although it contributes to the understanding of the prevalence of frailty in old people with CVA, the present study had limitations. As it did not use a representative sample and excluded patients with sequelae related to the disease such as severe cognitive impairment or communication impairment, the results cannot be extended to the entire population of old people affected by CVA. It is noteworthy that the healthcare service was not specific for the old population or this specific clinical condition.

## CONCLUSION

The evaluation model in the present study showed a good adjustment in terms of sensitivity and specificity for the estimation of frailty in the group of patients affected by cerebrovascular accident (CVA), finding sociodemographic and clinical aspects

associated with the outcome. The instrument selected for evaluation and classification allowed to verify that the majority of old people affected by CVA in this survey were frail.

The sample pointed to a profile of old people similar to those found in other national surveys with characteristics that point to the influence of gender, education, financial issues, and possibly related to access to healthcare services after a CVA. The data with significant results in the association with frailty corroborate what is pointed out in the literature, considering that marital status represented a greater risk for those who did not have a partner regarding sociodemographic data. For clinical aspects, associations were found with the presence of diabetes mellitus and absence of acute myocardial infarction.

Last but not least, we suggest further longitudinal studies and probabilistic samples to follow this type of population of old people affected by CVA from hospitalization to the rehabilitation process after discharge to clarify the process of functional and cognitive decline and its relation with frailty.

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