ISSN online: 2393-6606
doi: 10.22235/ech.v14i2.4672

Factors Associated with the Risk and Fear of Falling in Older Adults with Hypertension

Factores asociados al riesgo y miedo a caer en personas mayores con hipertensión

Fatores associados ao risco e ao medo de cair em pessoas idosas com hipertensão

Aelem Cristina Apolicena Dantas [1], *ORCID 0000-0002-9501-3431*
Maria Luiza Nunes Pires [2], *ORCID 0009-0003-0237-2860*
Dayane Tays da Silva [3], *ORCID 0000-0002-0285-7951*
Yara Lucy Fidelix [4], *ORCID 0000-0003-2390-0565*
Eduardo Quadros da Silva [5], *ORCID 0000-0002-5041-993X*
Lucas França Garcia [6], *ORCID 0000-0002-5815-6150*
José Roberto Andrade do Nascimento Júnior [7], *ORCID 0000-0003-3836-6967*
Daniel Vicentini de Oliveira [8], *ORCID 0000-0002-0272-9773*

[1 2 5 6] *Unicesumar, Brazil*

[3 4 7] *Universidade Federal do Vale do São Francisco, Brazil*

[8] *Universidade Estadual de Maringá, Brazil*

Abstract: Objective: To investigate the association between sociodemographic and health variables and the risk and fear of falling in the presence of systemic arterial hypertension among older adults. Methods: This cross-sectional study was conducted with 110 older individuals of both sexes, users of a Medical Specialty Center in Sapezal, Mato Grosso, Brazil, including 70 hypertensive patients on antihypertensive medication and 40 non-hypertensive individuals. A sociodemographic and health questionnaire, the Timed Up and Go (TUG) test, and the Falls Efficacy Scale-International (FES-I) were administered. Data were analyzed using the Chi-square test, binary logistic regression, and the Hosmer-Lemeshow test. A significance level of $p < 0.05$ was considered. Results: A significant difference was found when comparing proportions of hypertensive and non-hypertensive older individuals in terms of fall risk ($p < 0.001$) and fear of falling ($p < 0.001$), showing a higher proportion of individuals with fall risk and fear of falling associated with recurrent falls who are hypertensive. Additionally, older adults with a fear of falling associated with sporadic falls are 9.036 times more likely [95 % CI = 1.003-87.472] to be hypertensive compared to those with a fear of falling without associated falls. Conclusion: The findings highlight a significant association between multiple sociodemographic, health, and behavioral factors and hypertension in older adults.

Keywords: aging; hypertension; falls; fear of falling.

Resumen: Objetivo: Investigar la asociación entre las variables sociodemográficas y de salud y el riesgo y el miedo a caer en personas mayores con hipertensión arterial sistémica.

Métodos: Este estudio transversal se realizó con 110 personas mayores de ambos sexos, usuarias de un Centro de Especialidades Médicas en Sapezal, Mato Grosso, Brasil, que incluyen a 70 hipertensas en uso de medicación antihipertensiva y 40 no hipertensas. Se aplicó un cuestionario sociodemográfico y de salud, la prueba Timed Up and Go (TUG) y la Falls Efficacy Scale-International (FES-I). Los datos fueron analizados con la prueba de Chi-cuadrado, regresión logística binaria y la prueba de Hosmer-Lemeshow. Se consideró un nivel de significancia de $p < 0,05$. Resultados: Se encontró una diferencia significativa al comparar las proporciones de personas mayores hipertensas y no hipertensas en términos de riesgo de caídas ($p < 0,001$) y miedo a caer ($p < 0,001$), lo que muestra una mayor proporción de individuos con riesgo de caídas y miedo a caer asociados con caídas recurrentes que son hipertensos. Además, las personas mayores con miedo a caer asociado con caídas esporádicas tienen 9,036 veces más probabilidad [IC 95 % = 1,003-87,472]. Conclusión: Los hallazgos de este estudio destacan la asociación significativa entre múltiples factores sociodemográficos, de salud y conductuales y la hipertensión en personas mayores.

Palabras clave: envejecimiento; hipertensión; caídas; temor a caídas.

Resumo: Objetivo: Investigar a associação entre variáveis sociodemográficas e de saúde e o risco e o medo de quedas em pessoas idosas com hipertensão arterial sistêmica. Métodos: Este estudo transversal foi realizado com 110 pessoas idosas de ambos os sexos, que frequentavam um Centro de Especialidades Médicas em Sapezal, Mato Grosso, Brasil, incluindo 70 hipertensas em uso de medicação anti-hipertensiva e 40 não hipertensas. Foi aplicado um questionário sociodemográfico e de saúde, o teste Timed Up and Go (TUG) e a Falls Efficacy Scale-International (FES-I). Os dados foram analisados utilizando o teste Qui-quadrado, regressão logística binária e o teste de Hosmer-Lemeshow. Foi considerado um nível de significância de $p < 0,05$. Resultados: Foi encontrada uma diferença significativa ao comparar as proporções de pessoas idosas hipertensas e não hipertensas em termos de risco de quedas ($p < 0,001$) e medo de cair ($p < 0,001$), mostrando uma maior proporção de indivíduos hipertensos com risco de quedas e medo de cair associados a quedas recorrentes. Além disso, pessoas idosas com medo de cair associado a quedas esporádicas têm 9,036 vezes mais probabilidade [IC 95% = 1,003 a 87,472]. Conclusão: Os achados deste estudo destacam a associação significativa entre múltiplos fatores sociodemográficos, de saúde e comportamentais e a hipertensão em pessoas idosas.

Palavras-chave: envelhecimento; hipertensão; quedas; medo de cair.

Received: 06/18/2025 Accepted: 08/22/2025

How to cite:
Apolicena Dantas AC, Nunes Pires ML, Silva DT da, Fidelix YL, Quadros da Silva E, França Garcia L, Andrade do Nascimento Júnior JR, Vicentini de Oliveira D. Factors Associated with the Risk and Fear of Falling in Older Adults with Hypertension. Enfermería: Cuidados Humanizados. 2025;14(2):e4672. doi: 10.22235/ech.v14i2.4672

Correspondence: Daniel Vicentini de Oliveira. E-mail: d.vicentini@hotmail.com

Introduction

Aging brings physiological changes, including loss of elasticity in blood vessels, leading to arterial stiffening and increased ventricular contractility. This, in turn, can increase systemic blood pressure, contributing to the development of systemic arterial hypertension (SAH). [1, 2] SAH has been recognized as a predictor of poor prognosis in various health conditions, affecting target organs such as the heart, brain, kidneys, and arterial system. [3] The prevalence of SAH increases significantly with age, with a substantial proportion of older individuals being affected. For example, globally, it is estimated that about 60 % of older individuals aged 60-69 suffer from SAH, and this proportion increases even more at older ages. [4] In Brazil, the prevalence of SAH among older adults ranges from 46.9 % to 62.1 %, with a tendency to be higher in women and at more advanced ages. However, local studies show that this prevalence can be even higher in certain areas, reaching nearly 75 % among those over 60. [5]

In addition to its direct effects on cardiovascular health, SAH is intrinsically linked to aging-related complications such as gait changes, frailty, and an increased risk of falls in older adults. Antihypertensive medication treatment, although essential for blood pressure control, can paradoxically increase the risk of falls due to orthostatic hypotension, especially in older adults. This increased risk of falls can negatively impact these individuals' quality of life and independence. [5-7]

Considering the relationship between SAH and the fear of falling in older adults, it is essential to highlight that the fear of falling is a significant concern in this age group. The perception of fall risk can reduce physical activity and mobility, contributing to the cycle of frailty and decreased quality of life. [8, 9] Furthermore, individuals with SAH tend to report a greater fear of falling, possibly due to the association between this condition and the occurrence of adverse events such as fainting and dizziness. [10] Therefore, understanding this interaction between SAH and the fear of falling is crucial for developing effective fall prevention and health promotion strategies for older adults.

In addition to the factors mentioned, the prevalence of SAH in older adults is also associated with sociodemographic and health aspects. For example, it is more prevalent among individuals with low education, lower socioeconomic status, and low-prestige occupations. [10] Moreover, the presence of other health conditions, such as obesity, diabetes mellitus, and chronic kidney disease, significantly increases the risk of developing SAH in older adults. [11] A sedentary lifestyle and excessive alcohol consumption are also significant risk factors for developing SAH in this age group. [12]

These data underscore the importance of prevention and control strategies for SAH, considering not only clinical factors but also sociodemographic and behavioral aspects. Given the high prevalence and significant impacts of SAH on the health of the older population and its relationship with fall risk and fear of falling, more studies are needed to better understand these variables that influence the prognosis. Thus, this study aimed to investigate the association between sociodemographic, health, and risk variables and fear of falling with the presence of SAH in older people.

Methodology

This is a quantitative, observational, cross-sectional, and analytical study approved by the Research Ethics Committee of Cesumar University (Unicesumar), under number 6.301.362 (CAAE: 73641723.7.0000.5539), based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).

A non-probabilistic, convenience sample was intentionally selected, comprising 110 older adults (aged 60 years or older), of both sexes, who were users of a Medical Specialty Center in the municipality of Sapezal, state of Mato Grosso, Brazil. Among them, 70 were diagnosed with SAH and were on antihypertensive medication, while 40 had no diagnosis of SAH. The diagnosis of hypertension and the use of antihypertensive drugs were confirmed through electronic medical records available at the health facility.

To be included in the study, participants had to be registered in the municipality's health database and followed by both a cardiologist and an orthopedist. Exclusion criteria were: use of benzodiazepines (due to their central nervous system depressant effects, such as anticonvulsant, sedative, muscle relaxant, and anxiolytic actions); the presence of osteoarticular diseases or injuries that could hinder performance during physical testing; and previously documented cognitive impairments that would compromise the reliability of questionnaire responses. It is important to note that cognitive status was not directly assessed through formal scales during data collection. Instead, the presence or absence of cognitive deficits was verified using information already available in the patients' electronic medical records.

A formal sample size calculation was not conducted, as the total number of older adults registered in the health center's system was not clearly defined or accessible at the time of the study. Given these constraints, the convenience sampling approach was adopted. We acknowledge that this method may introduce a selection bias, which may limit the external validity and generalizability of the results. This limitation is addressed in the discussion section.

To evaluate the sociodemographic and health profile of older adults, a semi-structured questionnaire was developed by the authors specifically for this study. The instrument was designed to collect descriptive information and did not undergo a formal validation process, as it aimed solely to gather objective data related to personal and clinical characteristics. The questionnaire included questions on age, age group, sex, income in minimum wages, occupational status, retirement, education, marital status, use of antihypertensive medication, use of medicines in general, presence of comorbidities, history of falls, history of near falls, and class of antihypertensive used.

The risk of falls was assessed using the Timed Up and Go (TUG) test, which involves the older person rising from a chair, walking three meters, and returning to the chair. Individuals were only evaluated after familiarizing themselves with the course. A predictive value of ≥ 12.47 seconds was used for high fall risk and ≤ 12.47 seconds for low fall risk. [13]

The fear of falling was assessed using the Falls Efficacy Scale-International (FES-I), in its version validated for Brazil by Camargos et al. [14] This questionnaire consists of 16 items related to activities of daily living, in which individuals rate how concerned they are about falling while performing each task, using a 4-point Likert scale ranging from 1 (*not at all concerned*) to 4 (*very concerned*). The total score ranges from 16 to 64, with higher scores indicating a greater fear of falling. Standardized administration procedures were followed,

including individual application by trained evaluators in a quiet setting, ensuring participants' understanding of each item. Cut-off points were used to classify the results: < 23 indicates absence of fear of falling; ≥ 23 points indicates occasional fear of falling; and ≥ 31 points indicates recurrent fear of falling. [14]

First, authorization was requested from the Central Regulation of the Municipal Health Secretariat of Sapezal-MT to conduct the research. Subsequently, the Central scheduled specialized Cardiology and Orthopedics consultations, referring patients to the Medical Specialty Center, where consultations are held on pre-scheduled days and times. This allowed contact with older individuals diagnosed with SAH (or not) and their respective medical records.

Those who agreed to participate in the research signed the Informed Consent Form, and the researcher herself collected data from September to November 2023.

The data were analyzed using SPSS software version 25.0. Descriptive and inferential statistics were employed. Frequencies and percentages were used as descriptive measures for categorical variables. The Chi-square test was used to compare the proportions of hypertensive and non-hypertensive older individuals with sociodemographic, health, fall risk, and fear of falling variables. Binary logistic regression (both crude and adjusted analysis) was used to examine the associations of sociodemographic, health, fall risk, and fear of falling variables (independent variables) with the presence of SAH (dependent variable). For the regression analysis modeling, only variables with a significance level equal to or less than 0.05 for association with the presence of SAH in the Chi-square test were considered. The model fit was verified using the Hosmer-Lemeshow test. A significance level of $p < 0.05$ was considered.

Although SAH is a chronic condition that precedes functional outcomes such as falls or fear of falling, in this study it was used as the dependent variable in exploratory logistic regression analysis. The aim was not to infer causality, but rather to identify functional and clinical characteristics statistically associated with the presence of SAH in this population. This approach enables a better understanding of the health profile of hypertensive older adults and helps identify relevant associations for clinical screening and prevention strategies.

Results

In comparing the proportions of hypertensive and non-hypertensive older individuals based on sociodemographic variables (Table 1), a significant difference was found between the groups only in occupational status ($p = 0.047$). This difference indicates a higher proportion of older individuals who do not have an active occupational status and are hypertensive.

Table 1 – Comparison of proportions of hypertensive and non-hypertensive older individuals based on sociodemographic variables, Sapezal, Brazil, 2023

Variables	Groups		X^2	*p*-value
	Hypertensive (*n* = 70)	Non-hypertensive (*n* = 40)		
	f (%)	*f* (%)		
Gender				
Male	23 (53.5)	20 (46.5)	2.463	0.117
Female	47 (70.1)	20 (29.9)		
Age Group				
60 to 70 years	45 (58.4)	32 (41.6)		
71 to 79 years	23 (85.2)	4 (14.8)	0.548	0.459
80 years or more	2 (33.3)	4 (66.7)		
Marital Status				
With partner	29 (65.9)	15 (34.1)	0.164	0.686
Without partner	41 (62.1)	25 (37.9)		
Monthly Income				
1 to 2 MW	45 (62.5)	27 (37.5)	0.018	0.894
More than 2 MW	25 (65.8)	13 (34.2)		
Retirement Status				
Yes	54 (69.2)	24 (30.8)	2.843	0.092
No	16 (50.0)	16 (50.0)		
Occupational Status				
Yes	10 (45.5)	12 (54.5)	3.929	**0.047***
No	60 (68.2)	28 (31.8)		

*Significant association - $p < 0.05$: Chi-square test or Fisher's Exact Test. SM: minimum wage(s). MW: minimum wages.

Table 2 compares the proportions of hypertensive and non-hypertensive older individuals based on health variables. Significant differences were found between the groups regarding health perception ($p < 0.001$), medication use ($p < 0.001$), history of falls ($p = 0.004$) and near falls ($p < 0.001$), use of walking devices ($p = 0.047$), heart disease ($p < 0.001$), and diabetes ($p = 0.007$). There is a higher proportion of older individuals with poor health perception, using more than four medications, with a history of falls and near falls, using walking devices, having or having had heart disease, and with diabetes who are hypertensive.

Table 2 – Comparison of proportions of hypertensive and non-hypertensive older individuals based on health variables, Sapezal, Brazil, 2023

Variables	Groups		X^2	*p*-value
	Hypertensive (*n* = 70)	Non-hypertensive (*n* = 40)		
	f (%)	*f* (%)		
Perception of health				
Good	13 (36.1)	23 (63.9)		
Fair	47 (74.6)	16 (25.4)	17.271	**<0.001***
Poor	10 (90.9)	1 (9.1)		

Medication use				
1 to 2	6 (16.7)	30 (83.3)	45.451	**<0.001***
3 to 4	50 (83.3)	10 (16.7)		
More than 4	14 (100.0)	0 (0.0)		
History of falls				
Yes	27 (84.4)	5 (15.6)	8.388	**0.004***
No	43 (55.1)	35 (44.9)		
History of near-falls				
Yes	45 (81.8)	10 (18.2)	15.714	**<0.001***
No	25 (45.5)	30 (54.5)		
Use of a walking aid				
Yes	7 (100.0)	0 (0.0)	2.758	**0.047***
No	63 (61.2)	40 (38.8)		
Heart disease				
Yes	29 (100.0)	0 (0.0)	22.504	**<0.001***
No	41 (50.6)	40 (49.4)		
Stroke (CVA)				
Yes	6 (100.0)	0 (0.0)	2.155	0.085
No	64 (61.5)	40 (38.5)		
Diabetes				
Yes	25 (86.2)	4 (13.8)	7.396	**0.007***
No	45 (55.6)	36 (44.4)		
Rheumatic diseases				
Yes	24 (61.5)	15 (38,5)	0.115	0.735
No	46 (64.8)	25 (35.2)		
Respiratory diseases				
Yes	7 (87.5)	1 (12.5)	2.123	0.254
No	63 (61.8)	39 (38.2)		

*Significant association - $p < 0.05$: Chi-square test or Fisher's Exact Test. CVA: Cerebrovascular Accident.

According to the data in Table 3, a significant difference was observed when comparing the proportions of hypertensive and non-hypertensive older individuals based on fall risk ($p < 0.001$) and fear of falling ($p < 0.001$), indicating a higher proportion of older individuals with fall risk and fear of falling associated with recurrent falls who are hypertensive.

Table 3 – Comparison of proportions of hypertensive and non-hypertensive older individuals based on fall risk and fear of falling, Sapezal, Brazil, 2023

Variables	Groups		X^2	*p*-value
	Hypertensive (*n* = 70)	Non-hypertensive (*n* = 40)		
	f (%)	*f* (%)		
Fall risk				
No risk	20 (37.7)	33 (62.3)	29.651	**<0.001***
At risk	50 (87.7)	7 (12.3)		
Fear of falling				
Frequent association	4 (18.2)	18 (81.8)	33.003	**<0.001***
No association	24 (58.5)	17 (41.5)		
Occasional association	42 (89.4)	5 (10.6)		

*Significant association - $p < 0.05$: Chi-square test or Fisher's Exact Test.

For the logistic regression analysis, only the variables that showed a significance level <0.05 in the Chi-square test with the presence of SAH were considered (Table 4).

Table 4 – Factors associated with hypertension, Sapezal, Brazil, 2023

Variables	OR crude	OR adjusted [CI 95 %]
Smoking		
Yes	1	1
Never smoked	1.250 [0.343-4.558]	8.078 [0.574-113.614]
Former smoker	2.286 [0.712-7.338]	12.574 [0.923-170.927]
Occupational status		
Active	1	1
Inactive	2.571 [1.003-6.659]*	0.220 [0.029-1.656]
Perception of health		
Good	1	1
Fair	5.197 [2.144-12.600]*	0.109 [0.011-1.100]
Poor	17.692 [2.030-154.213]	0.032 [0.001–2.026]
History of falls		
Yes	1	1
No	0.228 [0.079-0.652]*	0.857 [0.136-5.399]
History of near-falls		
Yes	1	1
No	0.185 [0.078-0.441]*	0.209 [0.039-1.120]
Use of a walking aid		
Yes	1	1
No	0.000 [0.000-0.000]	0.000 [0.000-0.000]
Heart disease		
Yes	1	1
No	0.000 [0.000-0.000]	0.000 [0.000-0.000]
Diabetes		
Yes	1	1
No	0.200 [0.064-0.627]	0.356 [0.060-2.110]
Fall risk		
No risk	1	1
At risk	11.786 [4.484-30.981]*	0.811 [0.110-5.958]
Fear of falling		
No association	1	1
Occasional association	6.353 [1.822-22.150]*	9.036 [1.003-87.472]*
Frequent association	37.800 [9.082-157.327]*	10.682 [0.676-168.670]

*Significant association - $p < 0.05$: Binary Logistic Regression. Adjusted OR for all variables. OR: Odds Ratio; CI: Confidence Interval.

In the crude analysis, the following factors individually showed significant association ($p < 0.05$) with SAH: occupational status, health perception, medication use, history of falls and near falls, fall risk, and fear of falling. According to the data in Table 4, the crude logistic regression analysis showed that several variables were significantly associated ($p < 0.05$) with the presence of SAH, including occupational status, health perception, medication use, history of falls and near falls, fall risk, and fear of falling. In the

adjusted model, only medication use and fear of falling remained significantly associated with the presence of SAH.

It is important to emphasize that this association does not imply a causal relationship. The finding likely reflects the greater clinical complexity of hypertensive older adults, who tend to present with multiple comorbidities and, consequently, a higher number of prescribed medications. Similarly, fear of falling —particularly when associated with sporadic falls— was also independently associated with hypertension, with these individuals being 9.036 times more likely [95 % CI = 1.003–87.472] to have SAH compared to those reporting fear of falling without associated falls.

Discussion

The results of the present study revealed that older individuals who use a greater quantity of medications (in general, not just antihypertensives) are more likely to have SAH. Older individuals who fear falling associated with sporadic falls are also more likely to have SAH. Hypertensive older individuals are those with a higher proportion of individuals who have inactive occupational status, perceive their health as poor, have a history of falls and near-falls, use walking aids, have or have had heart disease and diabetes, and are at risk of falls or fear falling.

The fact that older individuals who use three to four medications are more likely to have SAH compared to those using one to two medications can be explained by these individuals generally facing greater complexity in their medication regimen. With multiple medications, there is a higher likelihood of forgetting or needing clarification about the correct administration of doses. This can lead to missed doses or improper administration, which can negatively affect blood pressure control, as Barroso et al. [15] noted. Furthermore, as Morais et al. [16] and Viana [17] suggest, the more medications prescribed, the greater the potential for drug interactions among them. These interactions can decrease the effectiveness of antihypertensive medications, making blood pressure control more challenging.

It is important to emphasize that the observed association between the number of medications used and the presence of SAH should not be interpreted as causal. Rather than suggesting that polypharmacy leads to SAH, this association likely reflects the greater clinical complexity of hypertensive individuals, who typically have multiple comorbidities requiring pharmacological management. The presence of SAH in these individuals is therefore more plausibly understood as part of a broader multimorbidity profile, in which higher medication use is a marker, not a cause. This interpretation aligns with current literature emphasizing the multifactorial nature of both hypertension and polypharmacy.

We found that older individuals with a fear of falling associated with sporadic falls are more likely to have SAH than those with a fear of falling without association with actual falls. This result may be because fear of falling can trigger a series of physiological responses, including chronic stress and anxiety, which in turn can contribute to an increase in blood pressure, especially in older adults whose stress regulation systems may be compromised due to aging. [18,19] Additionally, according to Nogueira et al., [20] fear of falling can lead to activity restriction and reduced mobility, thereby increasing the risk of developing or worsening SAH. As per the Alpsoy, [21] lack of regular physical activity can lead to weight gain, decreased cardiovascular fitness, and reduced effectiveness in blood pressure regulation.

In the present study, there was a higher proportion of older individuals who do not have active occupational status and are hypertensive. This can be justified because older individuals no longer actively engaged in occupational activities tend to lead a more sedentary lifestyle. As previously noted, lack of regular physical activity is associated with an increased risk of SAH, as physical activity helps to control blood pressure and maintain cardiovascular health. Additionally, the absence of occupation can lead to emotional stress and social isolation in some older individuals. Chronic stress can elevate blood pressure, while social isolation can have adverse effects on mental health, both indirectly contributing to SAH. [22]

We observed a higher proportion of older individuals who perceive their health as poor and hypertensive. This can be explained by the fact that older individuals who perceive their health as poor often deal with multiple medical conditions, including SAH, which frequently coexists with other chronic diseases such as diabetes, heart and kidney diseases. According to Rodrigues et al., [23] this accumulation of medical conditions can contribute to a negative perception of health. Moreover, SAH can significantly impact the quality of life, causing symptoms such as fatigue, headaches, dizziness, and difficulty concentrating. These symptoms can influence the health perception of older individuals, especially if they are not receiving adequate treatment or are facing challenges in blood pressure control. [5] Uncontrolled SAH can also lead to severe complications such as stroke and heart disease, which in turn can result in functional limitations and reduced ability to perform daily activities. [15] These limitations can negatively affect the health perception of older individuals, particularly if they are experiencing mobility difficulties or loss of autonomy.

We found a higher proportion of older individuals with a history of falls and near falls who are hypertensive, which can be explained by several factors. Firstly, SAH is often associated with medical conditions that increase the risk of falls, such as cardiovascular diseases, diabetes, and cognitive impairment. [24] Additionally, certain antihypertensive medications can cause side effects such as dizziness and weakness, which increase the risk of falls, especially in older adults. [15,25]

Another aspect to consider is that SAH can contribute to the deterioration of vascular health, including blood vessel health in the brain. This can increase the risk of cerebrovascular events, such as strokes, which in turn can predispose older individuals to falls. [26] It is worth noting that SAH may be associated with balance and mobility problems, which are significant risk factors for falls in older adults. [27]

We also observed a higher proportion of older individuals who use walking aids and are hypertensive. Older individuals who require walking aids often face physical health challenges such as muscle weakness, joint pain, or balance issues, which may be related to chronic conditions, including SAH. Furthermore, SAH can contribute to the deterioration of vascular health, including blood vessel health in the brain. [26] This can increase the risk of cerebrovascular events, such as strokes, affecting mobility, and the need for walking assistance devices.

It is also worth noting that SAH is associated with a range of medical conditions that can increase the risk of mobility impairment, such as heart disease, diabetes, and cognitive impairment. These conditions may require walking aids to ensure safety and stability during mobility. [28]

In the present study, we found that a higher proportion of older individuals who have or have had heart disease and diabetes are hypertensive. Several interconnected factors can

explain this finding. Firstly, SAH is closely linked to cardiovascular diseases such as coronary heart disease, heart failure, and arrhythmias. These cardiac conditions can elevate blood pressure due to impaired cardiac and vascular function. [29] Similarly, diabetes, especially when poorly controlled, can lead to cardiovascular complications such as atherosclerosis (narrowing of arteries due to plaque buildup), which increases the risk of SAH. [26] Insulin resistance, common in type 2 diabetes, can also contribute to the development of SAH. [30] Furthermore, both heart disease and diabetes involve a range of shared risk factors with SAH, such as obesity, sedentary lifestyle, poor diet, and family history. [14]

A higher proportion of older individuals with fall risk and fear of falling, mainly when associated with recurrent falls, were also found to be hypertensive. This finding can be attributed to several interconnected factors. SAH can contribute to the deterioration of vascular health, including blood vessel health in the brain. This can increase the risk of cerebrovascular events such as strokes, affecting mobility and increasing the risk of falls in older adults. [25] Additionally, certain antihypertensive medications can cause side effects such as dizziness and weakness, which may increase the risk of falls, especially in older individuals with fragile health conditions. [15, 25]

Fear of falling associated with recurrent falls can lead to a cycle of fear, anxiety, and activity restriction, which in turn can further reduce mobility and increase the risk of falls. This anxiety and fear may be exacerbated in hypertensive older individuals due to concerns about health and the potentially severe consequences of falls. [18]

Despite the relevant findings, this study presents limitations that must be acknowledged. First, the use of a non-probabilistic, convenience sample without prior sample size calculation—due to the unavailability of accurate data on the total number of older adults registered at the health center—introduces a potential selection bias. This limitation compromises the representativeness of the sample and restricts the generalizability of the results to broader populations.

Second, the study is subject to memory bias, as the collection of sociodemographic information, health status, and fear of falling relied on participants' self-report. Such data may be imprecise or influenced by subjective perceptions, potentially affecting the accuracy of the findings.

Third, although logistic regression was used to adjust for confounding factors, there may have been limited control over other important variables that could influence the associations studied. Some relevant variables may not have been included or fully captured, which could impact the robustness of the statistical modeling.

Additionally, it is important to clarify that SAH, although a chronic biological condition that typically precedes functional decline, was used in this study as the dependent variable in an exploratory logistic regression model. This analytical choice does not aim to establish causality, but rather to describe the functional and clinical characteristics associated with the presence of SAH in this specific population. The approach allowed for the identification of potential markers related to health vulnerability in hypertensive older adults. However, the limitations of interpreting reverse causality in this context must be acknowledged.

Finally, the complex interactions between SAH, fall risk, and fear of falling may not have been fully explored in this study. These phenomena are multifactorial and can be influenced by a range of clinical, psychological, social, and environmental factors not addressed in the present analysis.

Conclusion

The findings of this study underscore significant associations between multiple sociodemographic, health, and behavioral factors and the presence of SAH in older individuals. Fear of falling associated with sporadic falls, inactive occupational status, poor self-perceived health, history of falls and near falls, use of walking aids, presence of heart disease and diabetes, as well as increased fall risk and fear of falling, were more prevalent among hypertensive older adults.

These results reflect the complexity and interconnectedness of factors that may coexist with SAH in this population. Although causality cannot be inferred, the identification of these associations may help guide multidisciplinary approaches focused on screening, monitoring, and support for older adults with SAH.

Bibliographical references

1. Oliveros E, Patel H, Kyung S, Fugar S, Goldberg A, Madan N, et al. Hypertension in older adults: Assessment, management, and challenges. Clin Cardiol. 2020 Feb;43(2):99-107. doi: 10.1002/clc.23303

2. Ohldieck AE, Midtbø H, Kringeland E, Aune A, Gerdts E. Stronger Association Between Blood Pressure and Arterial Stiffness in Older Women than Men: The Hordaland Health Study. High Blood Press Cardiovasc Prev. 2025 May;32(3):353-361. doi: 10.1007/s40292-025-00719-8

3. Ott C, Schmieder RE. Diagnosis and treatment of arterial hypertension 2021. Kidney Int. 2022 Jan;101(1):36-46. doi: 10.1016/j.kint.2021.09.026

4. Hengel FE, Sommer C, Wenzel U. Arterielle Hypertonie - Eine Übersicht für den ärztlichen Alltag [Arterial Hypertension]. Dtsch Med Wochenschr. 2022 Apr;147(7):414-428. German. doi: 10.1055/a-1577-8663

5. Miranda CH. The Journey Towards Hypertension Control in Brazil. Arq Bras Cardiol. 2023 Nov 10;120(8):e20230533. English, Portuguese. doi: 10.36660/abc.20230533

6. Afsar B, Afsar RE. Hypertension and cellular senescence. Biogerontology. 2023 Aug;24(4):457-478. doi: 10.1007/s10522-023-10031-4

7. Krittanawong C, Rizwan A, Rezvani A, Khawaja M, Rodriguez M, Flack JM, Thijs RD, Juraschek SP. Misconceptions and Facts About Orthostatic Hypotension. Am J Med. 2025 Feb;138(2):190-195. doi: 10.1016/j.amjmed.2024.09.032

8. Guasti L, Ambrosetti M, Ferrari M, Marino F, Ferrini M, Sudano I, et al. Management of Hypertension in the Elderly and Frail Patient. Drugs Aging. 2022 Oct;39(10):763-772. doi: 10.1007/s40266-022-00966-7

9. Hashimoto S, Hosoi T, Yakabe M, Yunoki M, Matsumoto S, Kase Y, Miyawaki M, Ishii M, Ogawa S. Preventative approaches to falls and frailty. Osteoporos Sarcopenia. 2025 Jun;11(2 Suppl):50-53. doi: 10.1016/j.afos.2025.04.002

10. Kouchaki L, Darvishpoor Kakhki A, Safavi Bayat Z, Khan HTA. Association between fear of falling and self-care behaviours of older people with hypertension. Nurs Open. 2023 Jun;10(6):3954-3961. doi: 10.1002/nop2.1654

11. Zhou B, Perel P, Mensah GA, Ezzati M. Global epidemiology, health burden and effective interventions for elevated blood pressure and hypertension. Nat Rev Cardiol. 2021 Nov;18(11):785-802. doi: 10.1038/s41569-021-00559-8

12. Boudreaux BD, Romero EK, Diaz KM. Sedentary behavior and risk of cardiovascular disease and all-cause mortality in United States adults with hypertension. J Hypertens. 2023 Nov 1;41(11):1793-1801. doi: 10.1097/HJH.0000000000003540

13. Alexandre TS, Meira DM, Rico NC, Mizuta SK. Accuracy of Timed Up and Go Test for screening risk of falls among community-dwelling elderly. Rev Bras Fisioter. 2012 Sep-Oct;16(5):381-8. doi: 10.1590/s1413-35552012005000041

14. Camargos FFO, Dias RC, Dias JMD, Freire MTF. Cross-cultural adaptation and evaluation of the psychometric properties of the Falls Efficacy Scale – International Among Elderly Brazilians (FES-I-BRAZIL). Rev Bras Fisioter. 2010;14(3):237-243. doi: 10.1590/S1413-35552010000300010

15. Barroso WKS, Rodrigues CIS, Bortolotto LA, Mota-Gomes MA, Brandão AA, Feitosa ADM, et al. Brazilian Guidelines of Hypertension - 2020. Arq Bras Cardiol. 2021 Mar;116(3):516-658. English, Portuguese. doi: 10.36660/abc.20201238

16. Morais KB, Dantas LA, Triches CMF, Porfiro CA, Neto Filho MA, Santos JSG. Drug interactions with antihypertensives. Res, Soc Dev. 2022;11(2). doi: 10.33448/rsd-v11i2.25488

17. Viana KMA, Souza MM, Lima Filho FCR, Verde AVMCL, Nogueira EBS. Interações medicamentosas potenciais em idosos com Diabetes mellitus e Hipertensão Arterial Sistêmica em um centro de saúde integrada de Teresina-Piauí. BJHR. 2023;6(3):10762-10773. doi: 10.34119/bjhrv6n3-185

18. Santos SCA, Figueiredo DMP. Preditores do medo de cair em idosos portugueses na comunidade: um estudo exploratório. Ciênc Saúde Colet. 2019;24(1):77-86. doi: 10.1590/1413-81232018241.29932016

19. Britting S, Kob R, Görlitz A, Sieber CC, Freiberger E, Rohleder N. Chronic stress and functional health in older adults with concerns about falling: a study protocol of a randomized controlled trial with multicomponent exercise intervention (FEARFALL). Trials. 2024 Sep 20;25(1):621. doi: 10.1186/s13063-024-08462-6

20. Nogueira G, Fidelix YL, Nascimento Júnior JRA, Oliveira, DV. Physical activity and sedentary behavior as predictors of fear of falling and risk of sarcopenia in older adults. Fisioter Mov. 2023;36. doi: 10.1590/fm.2023.36118

21. Alpsoy Ş. Exercise and Hypertension. Adv Exp Med Biol. 2020;1228:153-167. doi: 10.1007/978-981-15-1792-1_10. PMID: 32342456

22. Foguet-Boreu Q, Ayerbe García-Morzon L. Psychosocial stress, high blood pressure and cardiovascular risk. Hipertens Riesgo Vasc. 2021 Apr-Jun;38(2):83-90. doi: 10.1016/j.hipert.2020.09.001

23. Rodrigues PV, Dias MSA, Brito MCC, Moita MP, Silva LCC, Moreira ACA. Autopercepção de hipertensos acompanhados pela estratégia saúde da família acerca da qualidade de vida. Sanare. 2020;18(2):7-14. doi: 10.36925/sanare.v18i2.1369

24. Xu Q, Ou X, Li J. The risk of falls among the aging population: A systematic review and meta-analysis. Front Public Health. 2022 Oct 17;10:902599. doi: 10.3389/fpubh.2022.902599

25. Gorostidi M, Gijón-Conde T, de la Sierra A, Rodilla E, Rubio E, Vinyoles E, et al. Guía práctica sobre el diagnóstico y tratamiento de la hipertensión arterial en España, 2022. Sociedad Española de Hipertensión - Liga Española para la Lucha contra la Hipertensión Arterial (SEH-LELHA) [2022 Practice guidelines for the management of arterial hypertension of the Spanish Society of Hypertension]. Hipertens Riesgo Vasc. 2022 Oct-Dec;39(4):174-194. Spanish. doi: 10.1016/j.hipert.2022.09.002

26. Mikael LR, Paiva AMC, Gomes MM, Sousa ALL, Jardim PCBV, Vitorino PVO, et al. Vascular Aging and Arterial Stiffness. Arq Bras Cardiol. 2022;119(4):604-615. doi: 10.5935/abc.20170091

27. Ang GC, Low SL, How CH. Approach to falls among the elderly in the community. Singapore Med J. 2020 Mar;61(3):116-121. doi: 10.11622/smedj.2020029

28. Souza LHR, Fernandes RS, Fagundes BDA. Variação da pressão arterial não se associa com a aptidão física e mobilidade funcional de idosas hipertensas. Rev Cienc Med Biol. 2023;22(1):58-62. doi: 10.9771/cmbio.v22i1.43532

29. Brazilian Society of Cardiology. Updated Cardiovascular Prevention Guideline of the Brazilian Society of Cardiology – 2019. Arq Bras Cardiol. 2019;113(4):787-891. doi: 10.5935/abc.20190204.

30. Cosenso-Martin LN, Yugar-Toledo JC, Vilela-Martin JF. Hipertensão e diabetes: conceitos atuais na terapêutica. Rev Bras Hipertens. 2021;28(3):213-218. doi: 10.47870/1519-7522/20212803213-18

Data availability: The data set supporting the results of this study is not available.

Authors' contribution (CRediT Taxonomy): 1. Conceptualization; 2. Data curation; 3. Formal Analysis; 4. Funding acquisition; 5. Investigation; 6. Methodology; 7. Project administration; 8. Resources; 9. Software; 10. Supervision; 11. Validation; 12. Visualization; 13. Writing: original draft; 14. Writing: review & editing.

A. C. A. D. has contributed in 1, 2, 3, 6, 10, 11, 12; M. L. N. P. in 3, 6, 10, 11, 12; D. T. S. in 3, 6, 10, 11, 12; L. F. G. in 3, 14; Y. L. F. in 11, 12, 13, 14; E. Q. S. in 11, 12, 13, 14; J. R. A. N. J. in 3, 14; D. V. O. in 1, 3, 5, 6, 7, 10, 11, 12, 13, 14.

Scientific editor in charge: Dr. Natalie Figueredo.