# Prevalence and factors associated with frailty in older adults with hypertension using the Edmonton Frail Scale and the Clinical Functional Vulnerability Index-20

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## Abstract

*Objective:* To assess the prevalence of frailty and compare the variables associated with frailty in Brazilian community-dwelling older adults with hypertension using the Edmonton Frail Scale (EFS) and the Clinical Functional Vulnerability Index-20 (IVCF-20). *Methods*: This is a cross-sectional analytical study conducted with community-dwelling older adults with hypertension aged ≥60 years residing in the city of Montes Claros, Minas Gerais, Brazil. Sample selection followed a probabilistic cluster sampling model. Data were collected between November 2016 and February 2017 through in-home questionnaire administration. Demographic, socioeconomic, and clinical-care variables were analyzed. Poisson regression with robust variance was used to obtain crude and adjusted prevalence ratios. *Results*: A total of 281 older adults with hypertension participated in the study. The overall prevalence of frailty as assessed by the EFS was 31.3%, and by the IVCF-20 was 22.1%. Variables that were statistically associated with frailty in older adults with hypertension, as determined by both the EFS and IVCF-20 simultaneously, were: advanced age (80 years or older), comorbidities such as rheumatoid arthritis/osteoarthritis, stroke, negative self-perception of health, falls, and hospitalizations in the last 12 months. Only by the EFS, variables associated with frailty included less than 4 years of education, absence of religious practice, and lack of personal income. Meanwhile, according to the IVCF-20, only monthly family income was associated with frailty. *Conclusion*: It was found that frailty assessed by EFS and IVCF-20 exhibits similarity; however, EFS is more sensitive. These findings underscore the imperative for healthcare professionals to early identify frailty.

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## INTRODUCTION

The aging of the Brazilian population is an ongoing process, characterized by cumulative physical and mental transformations, and an inevitable decline in organism functioning, which can impact health and nearly always the social context of the individual[1].

Aging is associated with frailty, described as a multidimensional syndrome encompassing biopsychosocial factors. This syndrome renders older adults vulnerable to external stressors, diminishing their quality of life and promoting functional dependency[2].

With the inversion of the age pyramid, there is an increase in the prevalence of non-communicable chronic diseases, among which systemic arterial hypertension (SAH) stands out as one of the main health burdens in this population[3], with an estimated prevalence of 71.7% for individuals above 70 years old[4].

Although systemic arterial hypertension is one of the diseases associated with frailty and is highly prevalent in older population, the screening for frailty among hypertensive older adults is not prioritized during geriatric assessment[5].

Existing geriatric scales predominantly follow unidimensionality, focusing solely on the physical aspect of the individual[6]. However, two instruments stand out for their proposal of multidimensional assessment of older adults: the Edmonton Frail Scale (EFS) and the Clinical-Functional Vulnerability Index-20 (IVCF-20)[2,7].

The EFS was developed by the Canadian Initiative on Frailty and Aging group, established in Canada, and is considered by many to be the most comprehensive as it incorporates cognitive, mood, and social support dimensions, in addition to being accessible for non-geriatricians/gerontologists[2,6]. The IVCF-20 was created by a multidisciplinary team with extensive expertise in older adults' healthcare.

When using the EFS, the prevalence of frailty in older adults ranged from 28.2% to 44.2%, while with the IVCF-20 it ranged from 19.5% to 44.2%[6,7]. In a longitudinal assessment using the EFS, 23.1% of older adults with hypertension experienced a worsening of their frailty status over 12 months, particularly when there is a negative perception of health status[8], underscoring the importance of multidimensional tools for this condition.

In this context, the ability to understand the interaction of biopsychosocial and environmental spheres in the establishment of frailty should be essential for the care of older adults. In this perspective, among the highlighted geriatric assessment scales in this study, the IVCF-20 and the EFS, there is still no clarity about their potentialities and criteria for choice, as they are rarely used simultaneously in scientific studies.

The comparison between the two instruments allows for investigating evidence of convergent validity, that is, the degree of agreement between the constructs assessed. Furthermore, comparing the associated factors in both scales can be useful in assisting professionals in choosing the most suitable instrument for their reality and needs, especially in the context of Primary Health Care[9].

Thus, this study aims to assess the prevalence of frailty and compare the variables associated with this condition in community-dwelling older adults with hypertension in Brazil using both the EFS and the IVCF-20.

## METHODS

The research is characterized as a cross-sectional and analytical study conducted with community-dwelling older adults with hypertension. This is a subset of the second stage of a larger research project on the health conditions of older population in the municipality of Montes Claros, MG, the original project entitled "Frailty in older adults: A Longitudinal Study" conducted with community-dwelling older adults[10]. The municipality where the study was conducted is of medium size, located in the North of Minas Gerais, Brazil, and has an estimated population of 417,478 inhabitants[11].

In the larger study, the inclusion criteria adopted were: age 60 years or older; residing in the selected household; capable of responding without alteration of consciousness level; or if otherwise, having a

caregiver/family member who could respond on their behalf. For the present subset of the study, in addition to the mentioned criteria, only older adults with diagnosed hypertension confirmed by a physician and the use of antihypertensive medications were included.

An estimated population of 30,790 older adults (13,127 men and 17,663 women) residing in the urban area was considered based on data from the 2010 census by the Brazilian Institute of Geography and Statistics (IBGE)[12]. From this, the sample size at baseline was calculated, considering a confidence level of 95%, a conservative prevalence of 50% for unknown outcomes, and a sampling error of 5%. The sampling was probabilistic by clusters, in two stages. Initially, by the census tract, where out of 362 urban sectors, 42 census tracts were randomly selected. Subsequently, the number of households was defined according to the population density of individuals aged 60 years or older.

The identified number was multiplied by a correction factor and a design effect (deff) of 1.5%, and increased by 15% for potential losses. The minimum number of older adults defined by the sample calculation was 656 individuals.

The interviews took place at the eligible older adults' homes. The data collection instrument consisted of questions investigating sociodemographic and economic profiles, behavioral aspects, health conditions, and access to healthcare services. Some questions were answered by caregivers of older adults who faced difficulties during the process, following the instructions provided in the geriatric assessment scales used for data collection.

The EFS assesses nine domains, across eleven items with scores ranging from zero to seventeen. It evaluates mobility, cognitive status, mood, functional independence, medication use, social support, nutrition, self-perceived health, continence, and disease burden. The final score ranges from zero to four indicating absence of frailty; five and six indicating older adults at risk of frailty; seven and eight indicating mild frailty; nine and ten indicating moderate frailty; and eleven or more points indicating severe frailty[2,13].

The IVCF-20, on the other hand, is a tool with 20 items covering eight conditions that assess the risk for clinical-functional decline in older adults, namely: age, self-perceived health, activities of daily living, cognition, mood, mobility, communication, and multiple comorbidities or recent hospitalization. The final score ranges from zero to forty. A score of zero to six points determines an older adult with low risk for clinical-functional decline; seven to fourteen points indicate moderate risk; and fifteen or more points indicate high risk of frailty[14].

The EFS and the IVCF-20 were applied simultaneously. It is worth noting that the clock drawing test, present in the EFS, was performed only by the older participants of the study, without the assistance of the caregiver.

After the questionnaires were administered, the results of the dependent variables were dichotomized into two categories: without frailty (final score ≤6) and with frailty (final score ≥7), according to the EFS, and without frailty (final score <15) and with frailty (final score ≥15) according to the IVCF-20 assessment. The independent variables analyzed were equally dichotomized into: gender, age group (up to 79 years or ≥80 years).

Age group was based on the division into long-lived older individuals (age ≥80 years) and young older individuals (age ≥60 years to 79 years). Marital status (with or without partner), family arrangement (living alone or co-resident), education level (up to four years of study or more than four years), ability to read (yes or no), religious practice (yes or no), personal income (yes or no), family income (up to one minimum wage or more), "Do you have private health insurance?" (yes or no), "Do you have any difficulty accessing and using your main health service when necessary?" (yes or no), presence or absence of self-reported non-communicable chronic diseases (systemic arterial hypertension, diabetes mellitus, heart disease, rheumatoid arthritis/osteoarthritis, osteoporosis, malignant neoplasms, pulmonary embolism, stroke, asthma/allergic bronchitis, COPD), self-perception of health, assessed through the question "How would you rate your health status?" (negative or positive), having a caregiver (yes or no), falls in the last 12 months (yes or no), medical consultations in the last

12 months (yes or no), and hospitalization in the last 12 months (yes or no).

The chronic diseases used in the study were considered through the analysis of data from the Surveillance System of Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel - Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico). Vigitel is a cross-sectional study conducted through telephone interviews with adults from the 26 state capitals and the Federal District, carried out annually by the Ministry of Health since 2006[15]. These health conditions were confirmed by medical diagnosis as well as by medication use.

Self-perceived health was considered positive when the responses were "very good" and "good," while responses such as "fair," "poor," and "very poor" were categorized as negative perception of health.

Descriptive frequency analyses were conducted initially. Subsequently, bivariate analyses were performed on both scales to examine factors associated with the dependent variable, frailty, utilizing the chi-square test. Poisson regression with robust variance was employed to assess prevalence ratios (PR), along with their respective 95% confidence intervals (CI 95%). Variables independently correlated with frailty were identified in the bivariate analysis, up to the significance threshold of 20% (p<0.20). To compose the final model, variables associated up to the significance level of 5% (p<0.05) were considered. In the selection of the most adjusted final model, Deviance and Pearson goodness-of-fit tests were used, alongside examination of Log Likelihood values and changes. Residual analysis was conducted through adjusted R-squared. Multicollinearity was assessed, and variables that were found to be correlated with each other were removed to improve the final model's fit. The study was conducted separately for each instrument, the IVCF-20 and the EFS.

After obtaining informed consent, with the participants' accession and signature, the Free and Informed Consent Form (FICF) was provided to the interviewees, containing the research description and information that it was approved by the Ethics Committee of the Faculdades Integradas Pitágoras de Montes Claros through the Substantiated Opinion Number 1,629,395.

## DATA AVAILABILITY

All the dataset supporting the results of this study is available upon request to the corresponding author [Jaciara Aparecida Dias Santos].

## RESULTS

Among the 685 individuals assessed at baseline, 92 refused to participate in the second phase of the study, 78 changed their address, 67 were not found at home after three attempts, and 54 had passed away. Therefore, 394 older adults participated in this stage of the study, and among them, 281 were hypertensive, forming the sample for this study.

The overall frailty (score ≥7) assessed by the EFS was 31.3% (n=88), while the high risk of clinical-functional vulnerability by the IVCF-20 (score ≥15) was 22.1% (n=62).

It was found that advanced age, less than 4 years of education, inability to read, lack of religious practice, no personal income, monthly family income equal to or less than 880, and difficulty accessing healthcare services were associated with frailty (p<0.20), as shown in Table 1.

In Table 2, the presence of heart disease, rheumatoid arthritis/osteoarthritis, osteoporosis, pulmonary embolism, stroke, negative self-perception of health, having a caregiver, experiencing falls, and hospitalizations in the last 12 months were associated with frailty (p<0.20).

The EFS classification applied in the study shows that the frequency of older adults described as non-frail (0-4) was 42.3% (n=119), vulnerable (5-6) were 23.6% (n=74), and frail (7 or more) were 31.3% (n=88). The IVCF-20 classifies the older adult as robust (0-6) with a frequency of 137 (48.8%), at risk of frailty (7-14) with 29.2% (n=82), and frail (15 or more) with 22.1% (n=62).

The variables that, after multiple analyses, compose the final model and were statistically associated with frailty in older adults with hypertension, according to both EFS and IVCF-20 simultaneously, were: advanced age, presence of rheumatoid arthritis/osteoarthritis, history of stroke, negative self-perception of health, falls, and hospitalizations in the last 12 months. Frailty was observed only through EFS in those with less than 4 years of education, no reported religious practice, and no personal income. Through IVCF-20 only, frailty was observed in older adults with hypertension with a monthly family income equal to or less than one minimum wage, as demonstrated in Table 3.

**Table 1.** Sociodemographic characterization and association with frailty in community-dwelling older adults with hypertension (bivariate analysis) (n=281). Montes Claros, MG, 2022.

| Independent Variables | Sample | Frailty EFS | | | Frailty IVCF-20 | | |
|---|---|---|---|---|---|---|---|
| | | Yes | No | | Yes | No | |
| | n(%) | n(%) | n(%) | $p$ | n(%) | n(%) | $p$ |
| Sex | | | | 0.862 | | | 0.813 |
| Male | 85(30.2) | 26(30.6) | 59(69.4) | | 18(21.2) | 67(78.8) | |
| Female | 196(69.8) | 62(31.6) | 134(68.4) | | 44(22.4) | 152(77.6) | |
| Age group | | | | 0.004 | | | <0.0001 |
| Up to 79 years | 213(75.8) | 57(26.8) | 156(73.2) | | 31(14.6) | 182(85.4) | |
| ≥ 80 years | 68(24.2) | 31(45.6) | 37(54.4) | | 31(45.6) | 37(54.4) | |
| Marital status | | | | 0.231 | | | 0.124 |
| With partner | 133(47.3) | 37(27.8) | 96(72.2) | | 24(18.0) | 109(82) | |
| Without partner | 148(52.7) | 51(34.5) | 97(65.5) | | 38(25.7) | 110(74.3) | |
| Family arrangement | | | | 0.862 | | | 0.191 |
| Lives alone | 40(14.2) | 13(32.5) | 27(67.5) | | 12(30.0) | 28(70) | |
| Co-resident | 241(85.8) | 75(31.1) | 166(68.9) | | 50(20.7) | 191(79.3) | |
| Education | | | | <0.0001 | | | 0.011 |
| Up to 4 years | 221(78.6) | 82(37.1) | 139(62.9) | | 56(25.3) | 165(74.7) | |
| > 4 years | 60(21.4) | 6(10.0) | 54(90) | | 6(10.0) | 54(90.0) | |
| Able to read | | | | 0.006 | | | 0.076 |
| Yes | 206(73.3) | 55(26.7) | 151(73.3) | | 40(19.4) | 166(80.6) | |
| No | 75(26.7) | 33(44.0) | 42(56.0) | | 22(29.3) | 53(70.7) | |
| Religious practice | | | | 0.046 | | | 0.538 |
| Yes | 271(96.4) | 82(30.3) | 189(69.7) | | 59(21.8) | 212(78.2) | |
| No | 10(3.6) | 6(60) | 4(40.0) | | 3(30.0) | 7(70.0) | |
| Personal income | | | | 0.128 | | | 0.192 |
| Yes | 250(89.0) | 82(32.8) | 168(67.2) | | 58(23.2) | 192(76.8) | |
| No | 31(11.0) | 6(19.4) | 25(59.8) | | 4(12.9) | 27(87.1) | |
| Family income | | | | 0.072 | | | 0.024 |
| Up to 880 | 3(26.0) | 29(39.7) | 44(60.3) | | 23(31.5) | 50(68.5) | |
| >881 | 208(74.0) | 59(28.4) | 149(71.6) | | 39(18.8) | 169(81.2) | |
| Private health insurance? | | | | 0.336 | | | 0.344 |
| Yes | 91(32.4) | 25(27.5) | 66(72.5) | | 17(18.7) | 74(81.3) | |
| No | 190(67.6) | 63(33.2) | 127(66.8) | | 45(23.7) | 145(76.3) | |
| Difficulty accessing health services | | | | 0.072 | | | 0.079 |
| Yes | 131(46.6) | 48(36.6) | 83(63.4) | | 35(26.7) | 96(73.3) | |
| No | 150(53.4) | 40(26.7) | 110(73.3) | | 27(18.0) | 123(82.0) | |

**Table 2.** Characterization of morbidities and utilization of health services; and association with frailty in community-dwelling older adults with hypertension (bivariate analysis), (n=281). Montes Claros, MG, 2022.

| Independent Variables | Sample | Frailty EFS | | | Frailty IVCF-20 | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | Yes | No | | Yes | No | |
| | n(%) | n(%) | n(%) | p | n(%) | n(%) | p |
| Diabetes mellitus | | | | 0.405 | | | 0.750 |
| Yes | 77(27.4) | 27(35.1) | 50(64.9) | | 16(20.8) | 61(79.2) | |
| No | 204(72.6) | 61(29.9) | 143(70.1) | | 46(22.5) | 158(77.5) | |
| Heart disease | | | | 0.005 | | | 0.001 |
| Yes | 92(32.7) | 39(42.4) | 53(57.6) | | 31(33.7) | 61(66.3) | |
| No | 189(67.3) | 49(25.9) | 140(74.1) | | 31(16.4) | 158(83.6) | |
| Rheumatoid arthritis/osteoarthritis | | | | 0.002 | | | 0.047 |
| Yes | 141(50.2) | 56(39.7) | 85(60.3) | | 38(27.0) | 103(73) | |
| No | 140(49.8) | 32(22.9) | 108(77.1) | | 24(17.1) | 116(82.9) | |
| Osteoporosis | | | | 0.002 | | | 0.019 |
| Yes | 109(38.8) | 46(42.2) | 63(57.8) | | 32(29.4) | 77(70.6) | |
| No | 172(61.2) | 42(24.4) | 130(75.6) | | 30(17.4) | 142(82.6) | |
| Malignant neoplasm | | | | 0.597 | | | 0.066 |
| Yes | 28(10.0) | 10(35.7) | 18(64.3) | | 18(64.3) | 10(35.7) | |
| No | 253(90.0) | 78(30.8) | 175(69.2) | | 52(20.6) | 201(79.4) | |
| Pulmonary embolism | | | | 0.007 | | | 0.002 |
| Yes | 12(4.3) | 8(66.7) | 4(33.3) | | 7(58.3) | 5(41.7) | |
| No | 269(95.7) | 80(29.7) | 189(70.3) | | 55(20.4) | 214(79.6) | |
| Cerebrovascular accident | | | | 0.005 | | | 0.001 |
| Yes | 25(8.9) | 14(56.0) | 11(44.0) | | 12(48.0) | 13(52.0) | |
| No | 256(91.1) | 74(28.9) | 182(71.1) | | 50(19.5) | 206(80.5) | |
| Asthma/allergic bronchitis | | | | 0.595 | | | 0.938 |
| Yes | 22(7.8) | 8(36.4) | 14(63.6) | | 5(22.7) | 17(77.3) | |
| No | 259(92.2) | 80(30.9) | 179(69.1) | | 57(22.0) | 202(78.0) | |
| COPD | | | | 0.171 | | | 0.743 |
| Yes | 20(7.1) | 9(45) | 11(55.0) | | 5(25.0) | 15(75.0) | |
| No | 261(92.9) | 79(30.3) | 182(69.7) | | 57(21.8) | 204(78.2) | |
| Self-perceived health | | | | <0.0001 | | | <0.0001 |
| Negative | 161(57.3) | 72(44.7) | 89(55.3) | | 49(30.4) | 112(69.6) | |
| Positive | 120(42.7) | 16(13.3) | 104(86.7) | | 13(10.8) | 107(89.2) | |
| Has caregiver | | | | 0.001 | | | <0.0001 |
| Yes | 34(12.1) | 19(55.9) | 15(44.1) | | 17(50.0) | 17(50.0) | |
| No | 247(87.9) | 69(27.9) | 178(72.1) | | 45(18.2) | 202(81.8) | |
| Falls in the last 12 months | | | | <0.0001 | | | <0.0001 |
| Yes | 97(34.5) | 44(45.4) | 53(54.6) | | 33(34.0) | 64(66.0) | |
| No | 184(65.5) | 44(23.9) | 140(76.1) | | 29(66.0) | 155(84.2) | |
| Had medical consultations in the last 12 months | | | | 0.527 | | | 0.148 |
| Yes | 261(92.9) | 83(31.8) | 178(68.2) | | 55(21.1) | 206(78.9) | |
| No | 20(7.1) | 5(25.0) | 15(75.0) | | 7(35.0) | 13(65.0) | |
| Hospitalization in the last 12 months | | | | <0.0001 | | | <0.0001 |
| Yes | 37(13.2) | 24(64.9) | 13(35.1) | | 18(48.6) | 19(51.4) | |
| No | 244(86.8) | 64(26.2) | 180(73.8) | | 44(18.0) | 200(82.0) | |

**Table 3.** Final model with factors associated with frailty in community-dwelling older adults with hypertension, according to the Edmonton Frail Scale and Clinical-Functional Vulnerability Index-20 (multiple analysis). Montes Claros, MG, 2022. (n=281)

| Independent Variables | Frailty EFS | | | Frailty IVCF-20 | | |
|---|---|---|---|---|---|---|
| | RP | 95%CI | $p$ | RP | 95%CI | $p$ |
| Age group | | | 0.006 | | | ≤0.001 |
| ≥ 80 years | 1.55 | | | 3.23 | | |
| Up to 79 years | 1 | 1.13–2.12 | | 1 | 2.11-4.94 | |
| Education | | | 0.006 | | | |
| Up to 4 years | 2.55 | 1.30 – 5.03 | | | | |
| > 4 years | 1 | | | | | |
| Religious practice | | | 0.006 | | | |
| No | 1.71 | | | | | |
| Yes | 1 | 1.17 – 2.51 | | | | |
| Personal income | | | 0.038 | | | |
| No | 0.53 | | | | | |
| Yes | 1 | 0.29 – 0.96 | | | | |
| Family income | | | | | | 0.44 |
| Up to 1 salary (880) | | | | 1.54 | 1.01–2.34 | |
| More than 1 salary (>881) | | | | 1 | | |
| Rheumatoid arthritis/osteoarthritis | | | 0.001 | | | 0.022 |
| Yes | 1.72 | 1.26 – 2.34 | | 1.61 | 1.07–1.42 | |
| No | 1 | | | 1 | | |
| Cerebrovascular accident | | | 0.002 | | | <0.0001 |
| Yes | 2.10 | 1.32 – 3.36 | | 2.95 | 1.83–4.76 | |
| No | 1 | | | 1 | | |
| Self-perceived health | | | <0.0001 | | | <0.0001 |
| Negative | 2.90 | 1.83 - 4.57 | | 2.75 | 1.68-4.50 | |
| Positive | 1 | | | 1 | | |
| Falls in the last 12 months | | | 0.024 | | | 0.038 |
| Yes | 1.45 | 1.05– 2.00 | | 1.54 | 1.02–2.34 | |
| No | 1 | | | 1 | | |
| Hospitalization in the last 12 months | | | <0.0001 | | | |
| Yes | 2.09 | 1.54 – 2.84 | | 2.26 | 1.45–3.52 | <0.0001 |
| No | 1 | | | 1 | | |

RP(aj): Adjusted Prevalence Ratio; CI(aj): Adjusted Confidence Interval.

## DISCUSSION

This study allowed for the assessment of frailty prevalence, as well as the identification and comparison of associated variables using both the EFS and the IVCF-20.

The findings revealed that both the EFS and the IVCF-20 identified different prevalence rates for the overall frailty score, with the EFS being more sensitive. It is observed that when applying the IVCF-20, a lower prevalence of frail hypertensive older adults was identified. This difference is significant and, when applied to the reality of healthcare services, may lead to situations such as older adults who would require management as frail individuals being excluded from this care protocol.

Similar results were observed in a study conducted with 12 primary healthcare units in the central-southern region of Belo Horizonte, MG, involving 396 older adults, where the correlation between the total scores of the IVCF-20 and the EFS was analyzed. Both scales exhibited analogies in the results. However, frailty was higher when analyzed using the EFS instrument compared to the IVCF-20[9]. A study conducted in Montes Claros, MG, with 394 community-dwelling older adults, showed a frailty prevalence of 28.2% using the EFS and 19.5% using the IVCF-20. The Kappa statistic revealed a concordance index of 0.599 between the instruments, indicating moderate to strong agreement and a positive correlation, with frailty prevalence being higher using the EFS[16].

This assertion can be justified by the clock-drawing test, a component present in the Edmonton Frail Scale, which assesses cognitive dimensions such as memory, motor development, regulatory and control function, and verbal comprehension. Such evaluations may result in more older adults being encompassed within the scope of frailty[9].

Another important factor that may explain the discrepancy found in the two scales is the cutoff point: 15 points for the IVCF-20 and 7 points for the EFS. Therefore, the analysis using the IVCF-20 identifies fewer frail individuals, but with greater needs for evaluation by specialist professionals. This fact contributes to determining the allocation of

resources destined for primary care[16]. Furthermore, the characteristics evaluated by the instruments differ, and there is a lack of consensus regarding the information considered to determine an older adult as frail. It is worth noting that frailty, according to the EFS, is categorized as mild, moderate, and severe, whereas in the IVCF-20, it is categorized only as frail[9].

In this context, when analyzing the association of frailty with arterial hypertension, according to Vetrano et al. (2018)[17], seven out of ten frail older adults present hypertension. Aprahamian et al. (2018)[18] and Anker et al. (2019)[19] observed a higher prevalence of hypertension among frail and pre-frail older adults compared to robust older adults. The causality between frailty and hypertension remains uncertain, as few longitudinal studies have assessed the impact of hypertension on frailty[20]. However, a study involving 200 community-dwelling older adults from the southern region of São Paulo/SP showed that hypertension, blood pressure levels, and the use of antihypertensive medications were not cross-sectionally associated with frailty status[21]. Nonetheless, it is possible to understand that aging is associated with chronic diseases, particularly arterial hypertension, which, due to its high prevalence in older adults, may contribute to the frailty of this population.

When evaluating the variable of "advanced age" among participants, this characteristic aligns with other findings in the literature, where hypertensive older adults showed a higher risk of frailty with advancing age[22]. Individuals aged over 85 years were found to have a 5.635 times higher chance of frailty compared to older adults below this age threshold[23]. This association may be related to the decrease in older adults' robustness, as the physiological and energy reserves of the human body tend to decline with advancing years[24].

Other factors associated with frailty in community-dwelling older adults with hypertension, regardless of the scale used, include the presence of rheumatoid arthritis/osteoarthritis and a history of stroke. This situation is corroborated in Pombal/PB, Brazil, with 307 community-dwelling older adults, where the presence of osteoarticular diseases showed a significant association ($p \leq 0.001$), as assessed by the

IVCF-20[25]. A history of stroke was associated with frailty in both instruments, as observed in a study conducted in the North of Minas Gerais. It is worth noting that osteoarticular diseases and stroke can affect the execution of activities of daily living in hypertensive older adults, leading to limited mobility and consequently increasing the risk of frailty, falls, hospitalizations, and mortality[26,27].

Negative self-perception of health also implies frailty in community-dwelling older adults with hypertension and was commonly assessed by both scales in the study. This finding is corroborated by other authors, where a significant difference was found between frail older adults and those who reported a worse perception of health[8,28]. Therefore, older adults with a negative self-perception of health have twice the risk of mortality over five years compared to those who self-assess their health positively, which serves as a warning regarding its potential as a marker for frailty in this population[29]. Negative self-perception of health influences how older adults cope with the aging process, directly impacting quality of life and morbidity.

Falls and hospitalizations in the last 12 months are significant factors contributing to frailty, also associated with frailty through the ESF and the IVCF-20. A review comprising 31 papers corroborates this finding by demonstrating an association between frailty and hospitalizations as well as falls in older adults[30]. Another study showed an association of frailty with advanced age, marital status, hospitalizations, and falls in the last year[31]. Furthermore, one or more hospitalizations in the last 12 months increase the prevalence ratio of frailty in older adults by 4.3 times[32]. Falls and hospitalizations result in limitations in mobility and functionality for older adults, as well as changes in their daily lives, exposure to diseases, and the occurrence of adverse events, leading to frailty and unfavorable outcomes.

The EFS, in isolation, also demonstrated an association between individuals with less than 4 years of education, no own income, and frailty. Low education levels, especially illiterate older adults, are significantly associated with a higher chance of frailty occurrence, as they are related to lower income and hinder access to healthcare, compromising the quality of life of older adults and leading to a higher risk of vulnerability and frailty[33].

Through the IVCF-20, an association was also identified between frailty and individuals with a monthly family income equal to or less than the minimum wage. Similarly, there was a statistically significant difference between frailty strata concerning per capita household income[34]. A monthly family income below the minimum wage results in a per capita income that hinders access to basic conditions for maintaining health.

Religious practice also showed a statistically significant association with frailty in community-dwelling older adults with hypertension, consistent with a study conducted in the northern region of Minas Gerais[10]. Religious practice acts as a protective factor against depression and, consequently, delays or prevents frailty, as it provides older adults with support during times of suffering and hope for improvement in their situation[35].

Henceforth, variables that exhibited statistical significance for both instruments simultaneously may indeed be important predictors of frailty in older adults with hypertension. It is noteworthy that the scales exhibit significant similarity, yet they are not unanimous in identifying which older adults with hypertension are frail.

In summary, screening and management studies of factors associated with frailty in environments catering to older adults, particularly those with systemic arterial hypertension, are necessary and indispensable. This initiative should commence within primary healthcare, the population's primary point of access. Evaluation should be multidisciplinary, aiming to detect markers early on.

Furthermore, few studies compare the instruments utilized in the present research. Another important factor is that this concerns a population from a specific and restricted locality, which prevents the generalization of the data to a national scope. Moreover, there was considerable sample loss, wherein potential participants for the study could have been included.

## CONCLUSION

The prevalence of frail older adults with hypertension, as determined by the application of the Edmonton Frail Scale (EFS), was higher, despite its similarity with the IVCF-20. It is also noteworthy that some of the associated factors diverged between the scales. The variables that were statistically associated with frailty by both scales were advanced age, rheumatoid arthritis/osteoarthritis, stroke, self-perceived health, falls, and hospitalizations in the last 12 months. Meanwhile, years of education, religious practice, and personal income were associated with frailty solely by the EFS. Monthly family income was associated with frailty solely by the IVCF-20.

These results demonstrate the need for a gold standard instrument to assess frailty, as well as the importance of capacitating and raising awareness among Primary Healthcare professionals regarding the applicability of these instruments. Thus, they can identify frailty in hypertensive older adults at an early stage. To achieve this, they can use the associated factors identified in this investigation as a basis. This investigation can also contribute to the development of programs aimed at this age group, aiming to minimize the deleterious effects of frailty on the autonomy and quality of life of older adults.

## AUTHORSHIP

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