

Frailty in hospitalized older adults: clinical, functional, and social assessment*

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Abstract

Objective: To analyze factors associated with frailty, as measured by the Clinical Frailty Scale, among older adults admitted to a hospital in the extreme South of Bahia, Brazil.

Materials and methods: Cross-sectional study, conducted in a hospital located in Bahia, Brazil. Older adults, hospitalized, were included. Data were collected using a questionnaire that contained sociodemographic and clinical data, as well as medical diagnoses. Additionally, the Clinical Frailty Scale, the Katz and Lawton-Brody Scales, and the Mini-Mental State Examination were included.

Results: Among 158 older adults (mean age 75), 20.9% were frail and 30.4% moderately to severely frail. The adjusted model showed that lack of physical activity increased the odds of pre-frailty (OR = 4.91) and frailty (OR = 4.69). Conversely, falls were associated with frailty (OR = 7.92) and with moderate-to-severe frailty (OR = 6.87). Finally, among the frailest individuals, associations were observed with prior hospitalizations (OR = 10.15) and with a lack of social participation (OR = 4.14).

Conclusion: The study found high frailty rates in older adults, mainly linked to clinical, functional, and social factors. Multivariate analysis showed physical inactivity, falls, and limited social participation were associated with frailty.

Descriptors: Frailty; Aging; Multivariate Analysis; Old Age Assistance; Frail Elderly (Source: DeCS, BIREME).

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Fragilidad en personas mayores hospitalizadas: evaluación clínica, funcional y social

Resumen

Objetivo: analizar los factores asociados con la fragilidad según la Escala Clínica de Fragilidad en adultos mayores ingresados en un hospital del extremo sur de Bahía, Brasil.

Materiales y métodos: se realizó un estudio transversal en un hospital de Bahía, Brasil, con adultos mayores hospitalizados. Se recogieron datos sociodemográficos, clínicos y diagnósticos mediante un cuestionario y se emplearon la Escala Clínica de Fragilidad, las escalas de Katz y Lawton-Brody y el Mini-Examen del Estado Mental.

Resultados: entre los 158 adultos mayores (edad media de 75 años), el 20,9% eran frágiles y el 30,4% eran moderadamente a gravemente frágiles. El modelo ajustado mostró que la falta de actividad física aumentaba las probabilidades de prefragilidad (OR = 4,91) y de fragilidad (OR = 4,69). Por el contrario, las caídas se asociaron con la fragilidad (OR = 7,92) y con la fragilidad moderada a grave (OR = 6,87). Por último, entre las personas más frágiles, se observaron asociaciones con hospitalizaciones previas (OR = 10,15) y con la falta de participación social (OR = 4,14).

Conclusión: el estudio identificó una alta prevalencia de fragilidad en adultos mayores, vinculada a factores clínicos, funcionales y sociales. El análisis multivariado mostró que la inactividad física, las caídas y la baja participación social se asocian con la fragilidad.

Descriptor: Fragilidad; Envejecimiento; Análisis Multivariado; Asistencia a los Ancianos; Anciano Frágil (fuente: DeCS, BIREME).

Fragilidade em idosos hospitalizados: avaliação clínica, funcional e social

Resumo

Objetivo: analisar os fatores associados à fragilidade, medida pela Escala Clínica de Fragilidade, entre idosos internados em um hospital no extremo sul da Bahia, Brasil.

Materiais e métodos: estudo transversal, realizado em um hospital localizado na Bahia, Brasil. Foram incluídos idosos hospitalizados. Os dados foram coletados por meio de um questionário que continha dados sociodemográficos, clínicos e diagnósticos médicos. Além disso, foram incluídas a Escala Clínica de Fragilidade, as Escalas de Katz e Lawton-Brody e o Mini-Exame do Estado Mental.

Resultados: entre 158 idosos (idade média de 75 anos), 20,9% eram frágeis e 30,4% moderadamente a gravemente frágeis. O modelo ajustado mostrou que a falta de atividade física aumentava as chances de pré-fragilidade (OR = 4,91) e fragilidade (OR = 4,69). Por outro lado, as quedas estavam associadas à fragilidade (OR = 7,92)

e à fragilidade moderada a grave (OR = 6,87). Por fim, entre aqueles mais frágeis, foram observadas associações com hospitalizações anteriores (OR = 10,15) e a falta de participação social (OR = 4,14).

Conclusão: o estudo encontrou altas taxas de fragilidade em idosos, principalmente relacionadas a fatores clínicos, funcionais e sociais. A análise multivariada mostrou que a inatividade física, as quedas e a participação social limitada estavam associadas à fragilidade.

Descritores: Fragilidade; Envelhecimento; Análise Multivariada; Assistência a Idosos; Idosos Fragilizados (fonte: DECS, BIREME).

Introduction

Frailty in older adults is a multidimensional clinical state characterized by reduced physiological reserve and increased vulnerability to stressors, leading to adverse outcomes such as falls, hospitalizations, disabilities, and early death (1, 2). Early recognition of this condition is essential to prevent complications, promote healthy aging, and support clinical decision-making, particularly in primary care, hospitals, and rehabilitation services (3, 4).

Population-level estimates of frailty prevalence vary widely across conceptual definitions and measurement instruments. A meta-analysis of 62 countries reported a prevalence of approximately 12% using the physical approach (e.g., Fried's phenotype) and approximately 24% using the cumulative deficit approach (5). In low- and middle-income countries, prevalence ranges from 3.9% to 59.4%, with a rounded mean of 17.4% for frailty and 49.3% for pre-frailty, indicating significant heterogeneity across regions and methods (6).

Among older adults, frailty is highly prevalent and recognized as an important risk factor for adverse outcomes, including functional disability, falls, hospitalizations, and mortality (3). Global estimates indicate that 10% to 25% of community-dwelling older adults are frail, and 40% to 55% are pre-frail, depending on the population and the instrument used (2, 7). In the hospital setting, a study of 53,361 hospitalized individuals found that 49.5% were considered frail (8).

Therefore, based on the above, the present study aims to analyze factors associated with frailty, as measured by the Clinical Frailty Scale (CFS), among older adults admitted to a hospital in the extreme South of Bahia, Brazil.

Methods

Study design

This cross-sectional and descriptive-analytical study was guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) tool (9). According to resolution No. 466/2012 of the National Health Council, which governs research involving human beings, the study was submitted for review and approved by the research ethics committee of Universidade Federal do Sul da Bahia (CAAE 80024124.0.0000.8467).

Study location and participants

The municipal hospital analyzed is part of the public health network in the extreme south of Bahia, Brazil. The institution performs hospitalizations and highly complex procedures for patients referred through the Bahia unified regulatory and emergency system, the emergency care unit, and the mobile emergency care service.

The hospital offers care for children aged 12 and over in the areas of clinical medicine, orthopedics, general surgery, and the intensive care unit (ICU). It has 135 inpatient beds, 10 ICU beds, 4 semi-intensive beds, and 5 operating rooms. Available specialties include general surgery, thoracic surgery, orthopedics, pulmonology, internal medicine, and anesthesiology.

Non-probabilistic convenience sampling was used to select participants. The choice of this technique is justified by the characteristics of the hospital setting, such as patient admissions turnover and changes in their clinical status during treatment, and the need to adjust time due to care routines of professionals, especially nurses.

To determine the sample size, data were collected from the SUS hospital information system on the number of older adults admitted for elective care between January and December 2023, totaling 1,034 older adults (i.e., aged 60 or over). From this information, a sample calculation was performed using the OpenEpi calculator (<https://www.openepi.com/SampleSize/ssPropor.htm>), assuming a prevalence of 61.7% (10), a 95% confidence interval, a 10% sampling error, and a design effect of 1.5. Based on these parameters, the sample size was defined as 126 elderly individuals. To account for potential losses and/or refusals, a 25% replacement rate was applied, yielding a final sample of 158 elderly individuals.

People aged 60 and older, of both genders, hospitalized for at least three days in the hospital's medical and surgical clinic, who were able to understand the questions during the evaluation and authorized to participate in the study, were included and signed the free and informed consent form. Excluded were those who were dependent on mechanical ventilation; in isolation rooms; confined to hospital beds and unable to walk; with limiting neurological disease; with lower-limb amputations; or at the end of life.

Data collection and analysis

Data were collected from July 2024 to February 2025. To obtain these, the evaluation instruments were a questionnaire, adapted (11, 12), which consists of four parts: 1. Sociodemographic data; 2. Clinical data; 3. Medical diagnosis; 4. CFS for assessing frailty, Katz (basic activities of daily living) and Lawton-Brody (instrumental activities of daily living) scales for analysis of functional capacity, and cognitive assessment measured through Mini-Mental State Examination.

The CFS is an instrument composed of nine clinical items, with higher scores indicating greater frailty (13), and has been validated in Brazil (14). The Katz index, also validated in Brazil (15), assesses independence in activities of daily living (ADLs) for older adults and chronically ill patients using six self-care activities arranged by complexity (i.e., eating, sphincter control, transfer, personal hygiene, dressing, and bathing) (16). The Lawton-Brody (17) in turn measures instrumental activities of daily living (IADLs), and is valid in Brazil (18).

For analysis, CFS was treated as the dependent variable; individuals were classified as not frail (score ≤ 3), pre-frail (score = 4), frail (score ≥ 5), or moderately to severely frail (score = 6–8) (14). Independent variables were sociodemographic (i.e., gender, skin color, marital status, education, and income) and clinical data (i.e., prior hospitalization, companion or complication during hospitalization, fall history, noncommunicable disease [NCD], participation in social activity, practice of physical activity, body mass index [BMI], and polypharmacy).

The tabulated data were imported into Stata statistical software (StatCorp®) version 12, where all analyses were performed. For categorical variables, absolute (n) and relative (%) frequencies were calculated. For continuous variables, results were presented as the mean and standard deviation.

To compare proportions across the frailty groups, a Pearson chi-square test was performed to assess associations between the independent variables and the frailty outcome (non-frail, pre-frail, frail, and moderately to severely frail). Variables with $p < 0.2$ were included in an ordinal regression model, and results were presented as odds ratios (OR) with 95% confidence intervals. Model adequacy was assessed using the Likelihood Ratio Test ($p < 0.05$), and multicollinearity was confirmed absent based on VIFs (mean 1.45).

Results

A total of 158 participants (79 men and 79 women) were evaluated, with a mean age of approximately 75 years (± 9.6). According to the CFS criteria, 16.5% ($n = 26$) were considered non-frail, 32.3% ($n = 51$) pre-frail, 20.9% ($n = 33$) frail, and 30.4% ($n = 48$) moderately to severely frail.

The average age was higher in the moderate and severely frail groups (79.6 years), followed by the frail (77.4 years), with a significant difference. Women were more frequent in moderate or severe frailty (31.6%), while men predominated in pre-frailty (38.0%). Black people are more concentrated among the most frail (38.9%). Individuals without a partner have a higher prevalence of moderate/severe frailty (36.0%), and those with a partner predominate in pre-frailty (40.3%). Those with no schooling (37.7%) are more common among the moderately/severely frail, and those who earn up to a minimum wage (33.8%) stand out in pre-frailty (Table 1).

Analysis of the health history of the older adults showed that 56.8% of individuals with moderate or severe frailty had previous hospitalizations, 46% had fallen, and 32.1% were diagnosed with NCD. Family caregivers were predominant among frail older adults, including those with moderate to severe frailty (47.6%). Among those who experienced complications during hospitalization, 43.5% had moderate or severe frailty. Physical activity was more prevalent among non-frail older adults (44.0%), whereas a lack of social activity was most common among those with moderate or severe frailty (35.1%). Polypharmacy was present in 41.2% of older adults with moderate to severe frailty. BMI indicated a higher prevalence of underweight among frail individuals with moderate to severe frailty (54.0%) (Table 2).

Regarding the length of hospital stay, it was found that among those classified as moderately or severely frail by the CFS, the average length of stay was approximately 15 days, compared with 11 days for non-frail people (Figure 1).

In the final ordinal model adjusted for CFS, pre-frail elderly individuals who did not engage in physical activity were a significant factor (OR = 4.91; 95% CI: 1.51–15.91). Among the frail, associations

were observed with lack of physical activity (OR = 4.69; 95 % CI 1.17–14.64) and a fall in the last six months (OR = 7.92; 95 % CI 1.52–41.28). Finally, for the moderately and severely frail, the most relevant factors were non-participation in social activities (OR = 4.14; 95 % CI 1.17–14.64), hospitalization (OR = 10.15; 95 % CI 1.87–55.01), and a fall in the last 6 months (OR = 6.87; 95 % CI 1.34–35.07) (Table 3).

Table 1. Sociodemographic characteristics of participants according to frailty status assessed by the cfs (n = 158)

	Non-frail		Pre-frail		Frail		Moderately to severely frail		p-value
	n	%	n	%	n	%	n	%	
Gender									0.23
Male	14	17.7	30	38.0	12	15.2	23	29.1	
Female	12	15.2	21	26.6	21	26.6	25	31.6	
Skin color									0.59
Black	8	22.2	8	22.2	6	16.7	14	38.9	
White	4	14.3	8	28.6	8	28.6	8	28.6	
Brown	14	15.2	35	38.0	18	19.6	25	27.2	
Indigenous	0	0	0	0	1	50.0	1	50.0	
Marital status									0.02*
With partner	16	22.2	29	40.3	10	13.9	17	23.6	
No partner	10	11.6	22	25.6	23	26.7	31	36.0	
Education level									0.32
No schooling	9	13.0	20	29.0	14	20.3	26	37.7	
Schooling	17	19.1	31	34.8	19	21.2	22	24.7	
Income									0.64
< One minimum wage**	20	15.0	45	33.8	28	21.1	40	30.1	
> Two minimum wages	6	24.0	6	24.0	5	20.0	8	32.0	

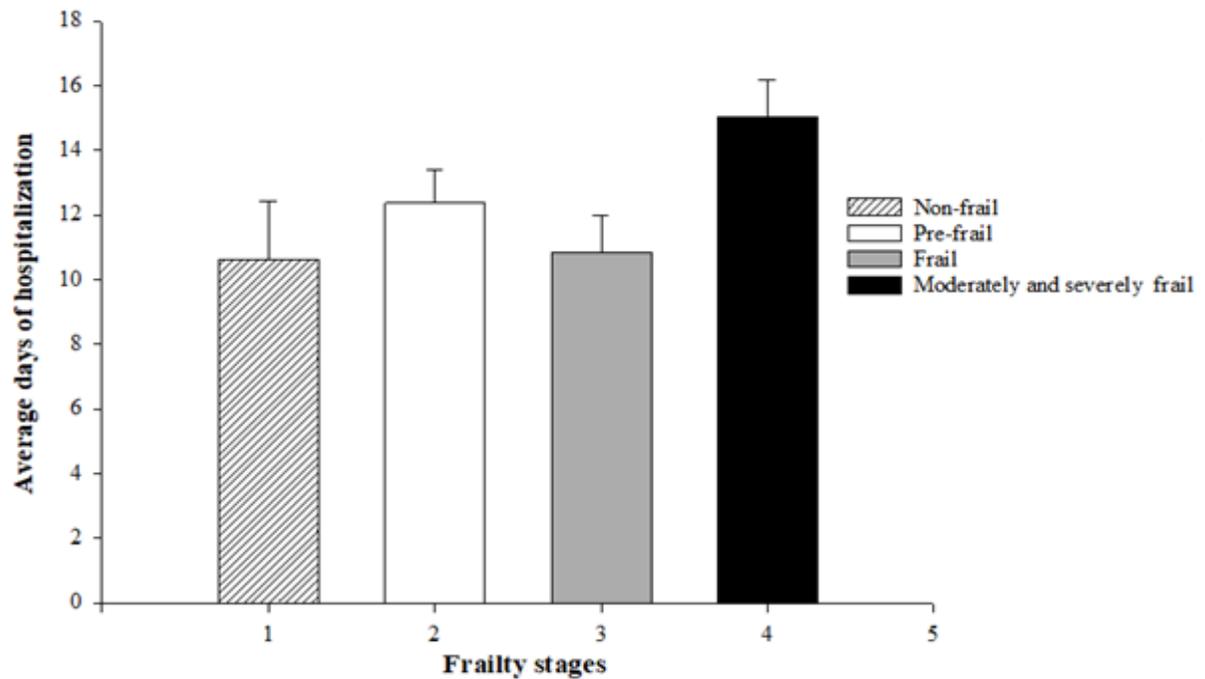
Note. * statistically significant difference by the chi-square test; ** R\$ 1,302.00
Source: Own elaboration.

Table 2. Characteristics of participants' health history by frailty status, as evaluated by CFS (n = 158)

	Non-frail		Pre-frail		Frail		Moderately to severely frail		p-value
	n	%	n	%	n	%	n	%	
Prior hospitalization									<0.01*
Yes	2	5.41	5	13.5	9	24.3	21	56.8	
No	24	19.8	46	38.0	24	19.8	27	22.3	
Companion of the hospitalization									<0.01*
Extra-family caregiver	0	0	1	7.7	9	69.2	3	23.1	
Family caregiver	26	17.9	50	34.5	24	16.6	45	31.0	
Complications during hospitalization									0.07
Yes	4	8.7	12	26.1	10	21.7	20	43.5	
No	22	19.6	39	34.8	23	20.5	28	25.0	
Fall history									<0.01*
Yes	2	4.0	9	18.0	16	32.0	23	46.0	
No	24	22.2	42	38.9	17	15.7	25	23.1	
NCDS									0.10
Yes	20	14.3	44	31.4	31	22.1	45	32.1	
No	6	33.3	7	38.9	2	11.1	3	16.7	
Participation in activity social									0.03*
Yes	12	27.3	17	38.6	7	15.9	8	18.2	
No	14	12.3	34	29.8	26	22.8	40	35.1	
Practice of physical activity									<0.01*
Yes	11	44.0	6	24.0	3	12.0	5	20.0	
No	15	11.3	45	33.8	30	22.6	43	32.3	
BMI									0.11
Low weight	5	10.0	18	36.0	9	18.0	18	36.0	
Eutrophic	11	25.6	11	25.6	9	18.0	18	36.0	
Overweight	9	20.0	19	42.2	11	24.4	6	13.3	
Polypharmacy									0.03*
Yes	6	11.8	10	19.6	14	27.5	21	41.2	
No	20	18.7	41	38.3	19	17.8	27	25.2	

Note. NCDS: chronic non-communicable diseases; BMI: body mass index; * statistically significant difference by chi-square test.
Source: Own elaboration.

Figure 1. Average length of stay according to CFS criteria



Source: Own elaboration.

Table 3. Factors associated with frailty in older adults, by severity level, according to CFS

	Adjusted model a	
	OR [95% CI]	p-value
Pre-frail		
Without physical activity	4.91 [1.51-15.91]	<0.01
Frail		
Without physical activity	4.69 [1.17-14.64]	0.04
Fall in the last 6 months	7.92 [1.52-41.28]	0.01
Moderately to severely frail		
Without participation in social activities	4.14 [1.17-14.64]	0.03
Hospitalization in the last 6 months	10.15 [1.87-55.01]	<0.01
Fall in the last 6 months	6.87 [1.34-35.07]	0.02

Note. OR: odds ratio; CI: confidence interval; a marital status, hospitalization companion, NCD, BMI, and polypharmacy.

Source: Own elaboration.

Discussion

The final analysis showed that the different CFS categories were associated with not performing physical activity (pre-frail, frail, and moderately/severely frail), a history of falls (frail and moderately/severely frail), and a history of previous hospitalization (moderately/severely frail).

In recent years, growing interest in frailty syndrome as a medical construct has led to an increase in publications evaluating CFS. In general, these studies measured CFS across diverse population groups, providing a comprehensive representation of the geriatric population. Preliminary analyses of these data showed associations between CFS and several individual characteristics, as well as significant clinical outcomes. By integrating clinical judgment, objective measurement, and ease of application, CFS is currently considered one of the most promising and viable tools for screening frailty in both routine assessments (19) and, particularly, in acute care settings (20).

In this study, the average age was higher in the group classified as moderately to severely frail, followed by the frail. The results obtained are in line with the study that found a positive correlation between frailty and age and indicated that the older the older adult, the higher the frailty rate (21). Similarly, another study conducted in the extreme south of Bahia found that frailty was more frequent (37.5%) among participants aged 70–79 years (22).

Regarding gender, severe frailty was more common among women. Similar results showed that the prevalence of frailty is higher in women than in men (23–25). The relationship between frailty and female gender may be driven by survival effects that lead to greater accumulation of deficits associated with frailty over time (5). Furthermore, women seek greater access to health care than men, especially for disease prevention and health promotion (26).

Regarding marital status, the results suggest that the absence of a partner is a risk situation for the development of the syndrome, as its lack implies a lack of support to help with daily care. Similar results were observed in a study that showed that people without a partner (i.e., single and/or widowed) had a higher syndrome score (27). Every year, the number of people living alone increases, and the elderly who find themselves in this condition have a lower economic status, high prevalence of chronic diseases, multimorbidities, depressive symptoms, and a high percentage of falls and abuse (28).

The association between frailty and prior hospitalizations highlights the cyclical nature of frailty in the hospital setting. This suggests that the hospital environment itself, often characterized by immobility and acute physiological stress, may exacerbate the frailty syndrome, increasing the risk of readmissions as observed in our findings and supported by the literature. Around a quarter of frail patients were readmitted within 90 days of discharge (5, 27).

Regarding the history of falls, this study corroborates research demonstrating a statistically significant association between falls and frailty, showing that most frail older adults had fallen at least once in the last 3 months (27, 29). On the other hand, research conducted with older adults in two university hospitals in the state of Paraíba highlighted a significant association between the risk of falls and age over 70 years, more than four pre-existing diseases, and no work activity (30). Additionally, a study conducted with older adults admitted to a university hospital in Turkey showed that individuals who had suffered a fall in the last year were significantly more frail than those who had not (31).

About behavioral factors, the present study identified an association between the absence of physical activity and frailty, as evidenced by another study that observed greater frailty among individuals with insufficient physical activity and sedentary behavior (32). It has been shown that frailty is associated with the timing of exposure to sedentary behavior, indicating that exchanging 60 min/day of sedentary behavior or sleep for 60 min/day of moderate physical activity was associated with a 48% reduction in frailty prevalence (33).

These findings have direct implications for nursing practice, particularly in the context of comprehensive geriatric assessment. The association among frailty, falls, and physical inactivity underscores the need for nurses to implement targeted fall-prevention protocols and promote early mobilization during hospitalization. Furthermore, identifying frailty through the CFS enables nurses to coordinate interdisciplinary care that fosters social participation and family support, both of which are crucial for mitigating functional decline in the hospital setting.

Despite its relevance, this study has limitations that must be considered. First, the cross-sectional design prevents the establishment of causal relationships among the variables under study. Second, the use of non-probabilistic convenience sampling in a single hospital setting limits the generalizability of the results to the broader geriatric population. Regarding the instruments, the CFS depends on clinical judgment, which can introduce inter-observer variability. Future longitudinal studies with representative samples are needed to further elucidate the trajectories of hospital frailty.

Conclusions

The study identified a high prevalence of frailty among the evaluated older adults, characterized by a profile associated with clinical, functional, and social factors. According to the multivariate analysis, physical inactivity, a history of falls, and limited social involvement were the factors most significantly associated with the syndrome in this population. These findings underscore the importance of nursing practice in conducting comprehensive geriatric assessments and implementing targeted protocols for fall prevention and for promoting physical and social activity within the hospital environment.

These findings emphasize the need for comprehensive prevention and intervention strategies that promote physical activity, social engagement, and appropriate management of health conditions to reduce frailty risk in older adults.

Conflicts of interest

The authors declare no conflict of interest.

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P R E L I M I N A R Y