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PREVALENCE AND FACTORS ASSOCIATED WITH FRAILTY IN LONGEVOUS ELDERLY: AN SYSTEMATIC REVIEW

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ABSTRACT

Frailty is a biological syndrome characterized by a number of age-related clinical conditions. The prevalence of specific frailty among the longevous population remains poorly investigated. In this context, the present study aimed to identify, through an systematicliterature review, the prevalence and factors associated with frailty in longevous elderly. This is a bibliographic study,systematicliterature review type, of studies published in Portuguese, English and Spanish, through the PICO strategy, in four databases, MEDLINE/PUBMED, Scielo, Ebsco and Science Direct conducted from April to May 2022. The selection resulted in three studies, two cross-sectional studies and one prospective cohort study. The prevalence of frailty among the longevous elderly ranged from 12.4% to 64.7%. As for associated factors, the studies showed associations between frailty and gender, increasing age, hospitalization in the past 12 months, residence in a long-stay institution, chronic conditions, dyslipidemias, metabolic diseases, depression, dementia, visual and hearing impairments, disability for ≥ 2 activities of daily living, and falls.

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INTRODUCTION

With increasing life expectancy, the elderly population has been growing rapidly worldwide (Mathers *et al*., 2015; Neumann; Albert, 2018). And according to World Health Organization(2021) estimates, the number of people aged 80 years and older is expected to triple between 2020 and 2050, reaching nearly half a billion worldwide. This gain in life expectancy has been driven by advances in public health, socioeconomic development, sanitation, public education, and health care. However, there is still pressure on the health care system to deal with the challenge of aging (Hoogendijk *et al*., 2019). Over the years, decline in various systems occurs, physiologically or pathologically, impacting homeostatic capacity and resulting in negative conditions such as frailty (Silva *et al*., 2020). Frailty is a biological syndrome characterized by a series of age-related clinical conditions that show deterioration in strength and physiological malfunction (Dent *et al*., 2019; Wang *et al*., 2021). The more advanced the age, the greater the chance of becoming functionally vulnerable (Hoogendijk *et al*., 2019; Feitosa *et al*., 2020; Silva *et al*., 2020). However, when it comes to assessing frailty in longevous elderly there is a difficulty in obtaining answers, with this, frailty among the longevous population remains poorly investigated (Wang *et al*., 2021). A study carried out with elderly people assisted at a Basic Health Unit in a city in the Northeast of Brazil, observed that the elderly aged 70 to 90 years presented themselves more fragile than those in other age groups, with 31% in the age group 70 to 79 years and 34% in the age group 80 to 90 years, the latter being considered longevous elderly (Feitosa *et al*., 2020). Carneiro *et al*., (2020) compared the frailty of the elderly through the Edmonton Frail Scale (EFS) and the Index of Clinical-Functional Vulnerability-20 (IVCF-20) instruments and observed that in both instruments the elderly aged 80 or older have a higher chance of frailty. In the study by Wang *et al*., (2021), 13,859 elderly were stratified by age, and identified a prevalence of frailty among the young (≤ 79 years), octogenarians, nonagenarians and centenarians of 4.8%, 19.4%, 39.9% and 59.0%, respectively, demonstrating that with advancing age, the prevalence of frailty, increases. All seniors are susceptible to developing frailty, although risk levels are higher in longevous seniors, and/or among those with comorbidities, low socioeconomic status, and sedentary lifestyles. Lifestyle and clinical risk factors are potentially modifiable by specific interventions and preventive actions (Hoogendijk *et al*., 2019; Silva *et al*., 2020). Considering that most studies on frailty have a sample of predominantly young elderly (≤ 79 years), it is necessary to expand the knowledge related to frailty in longevous elderly in order to improve the understanding of the predictors, as well as to identify the manifestation of frailty in this population. In this context, the present study aimed to identify, through na systematic literature review, the prevalence and factors associated with frailty in longevous elderly.

METHODS

This is ansystematicliterature review of population-based cross-sectional and/or longitudinal studies, with the objective of identifying the prevalence and factors associated with frailty in longevous elderly. Data collection was carried out in April and May 2022, guided by the question: 'What is the prevalence of frailty in longevous elderly and associated factors?' A systematic search was carried out in electronic databases: Medical Literature Analysis and Retrieval System Online (MEDLINE/PUBMED), Scientific Electronic Library Online (SCIELO), Business Source Complete (Ebsco), and ScienceDirect. In addition to the databases described, articles identified in reference lists of other reviews or original studies related to the topic were also used. The inclusion criteria were original articles that evaluated frailty in elderly individuals aged ≥ 80 years, published between 2017 and 2022 in Portuguese, English, and Spanish. Articles that did not present in the title the combination of at least two of the descriptors used in the search, and that included in their sample individuals aged less than 80 years, in order to answer the objective of the study, which was to evaluate the prevalence of frailty in longevous elderly (≥ 80 years), were excluded from the review. Review articles, dissertations, theses, chapters, and books were also not included. For the selection of articles, a combination of the following terms was used: frailty, longevous elderly, and prevalence, combined with the Boolean operators "AND" and "OR". All these terms were identified in the title or abstracts of the articles using the PICO strategy. PICO represents an acronym for Patient, Intervention, Comparison and Outcomes (Santos; Pimenta; Nobre, 2007), it is a strategy that uses evidence-based medicine/practice and, therefore, it is expected that the titles of the articles are clear in all or some of these items of this acronym (AKOBENG, 2005). Additional resources were used according to database availability [e.g., Medical Subject Headings (MeSH)] to amplify the search. The search strategies were carried out by combining the descriptors in the English language and their correspondents in Portuguese and Spanish: "Frailty", "Frail Elderly", "Aged", "Prevalence", associated factors, to combine the descriptors and terms used for tracking the publications.

RESULTS

A total of 1413 studies were examined, of these, 192 were repeated among the databases, and 1221 studies were included. After reading the title, 862 articles were excluded, leaving 359 studies for analysis. After this step, the abstracts of the articles were read, and 307 were excluded for not answering adequately the PICO question, and from this, 52 articles were included for reading in full. In the end, 3 articles were analyzed in this systematic review, which m *et al* the eligible criteria for the construction of the study (Figure 1).

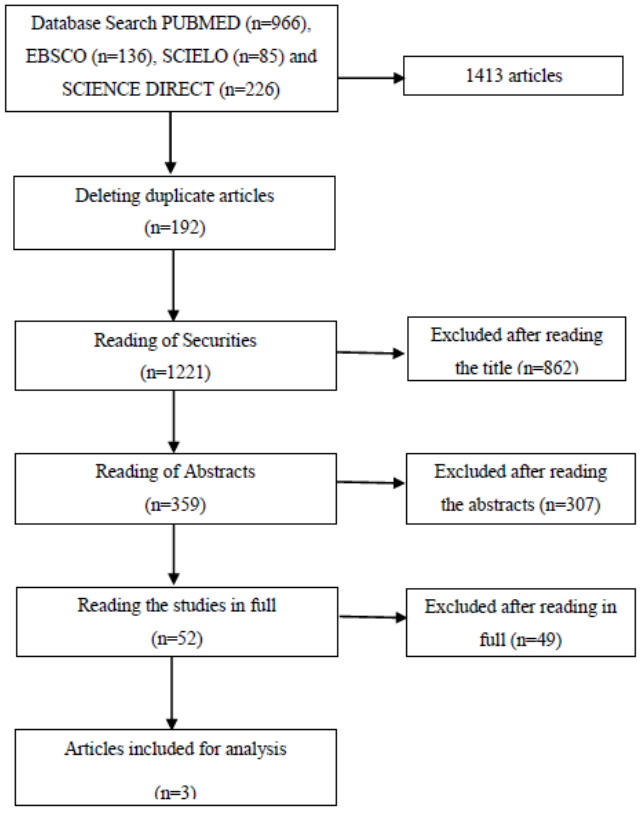

Figure 1. Flowchart of article selection

Regarding the design of the included studies, two studies were cross-sectional (Sousa *et al*., 2018; Herr *et al*., 2018) and one was a prospective cohort study (Hajek *et al*., 2020), which met the previously established inclusion criteria. The studies analyzed were published in three different journals. Two studies published in a journal evaluated by qualis CAPES in the area of gerontology; and one study in a nursing journal. Regarding the language of the selected articles, one was in Portuguese, and two publications were in English. Regarding sample size, there was a quantitative variation from 243 to 1253 elderly longevous individuals.

Table 1. Studies characteristics, frailty prevalence, and associated factors

Author (Year)	Journal	Study Design	Sample (n)	Analysis type/ Statistical Test	Prevalence	Associated Factors	Outcomes
Sousa et al., (2018)	Latin-Am. Nursing Journal	Cross-sectional	243	Multivariate Analysis/Logistic Regression	14,8%	- Hospitalization in the past 12 months (OR = 2.50; p = 0.045); - Dyslipidemia (OR = 0.32; p = 0.058); - Metabolic disease (OR = 1.99; p = 0.028).	It is inferred that clinical variables interfere in the development of the physical frailty syndrome in longevous elderly users of primary health care. The election of a regression model of physical fragility constitutes the first step in the elaboration of clinical conducts of evaluation of longevous elderly in Primary Care.
Herr et al., (2018)	Gerontology	Cross-sectional	1253	Multivariate Analysis/Logistic Regression	64,7%	- Male sex (OR = 0.85; p ≤ 0.001); - Residence in a long-term care facility (OR = 1.06; p ≤ 0.05); - Depression (OR = 1.08; p ≤ 0.05); - Dementia (OR = 0.91; p ≤ 0.01); - Visual impairment (OR = 1.06; p ≤ 0.05); - Hearing impairment (OR = 1.07; p ≤ 0.01); - Impairment for ≥ 2 ADLs (OR = 1.27; p ≤ 0.001); - Falls (OR = 1.13; p = >0.01).	Reaching age 100 rarely goes without frailty - nearly a third of centenarians were even "very frail". Expected associations were found with gender, depression, falls, disability, and sensory impairments.
Hajek et al., (2020)	Gerontology	Prospective cohort	1st moment (n = 451) 2nd moment (n = 462) 3rd moment (n = 388)	Multivariate Analysis/ Linear Regression	1st moment 12.4%moderate 0,4% Severe 2nd moment 16.0% moderate 0,7% Severe 3rd moment 17.0% moderate 1,8% Severe	- Increasing age (β = 0.23; p < 0.001); - Dementia (β = 0.84; p <0.01); - Increase in chronic conditions (β = 0.03; p = 0.058).	The study results particularly emphasize the importance of aging, chronic conditions, and frailty dementia. Interventions aimed at preventing or delaying, for example, dementia may also help to delay or prevent frailty.

As for the countries of origin of the studies, Sousa *et al*., (2018) evaluated elderly users of Primary Health Care in Northeast Brazil. Herr *et al*., (2018) evaluated centenarians from France, Sweden, Switzerland and Denmark, while Hajek *et al*., (2020) estimated the prevalence and factors associated with frailty in elderly people from Primary Care in Germany. In two of the studies (Sousa *et al*., 2018; Herr *et al*., 2018), the frailty syndrome was identified according to the five criteria proposed by Fried *et al*., (2001), known as frailty phenotypes: 1) Unintentional weight loss; 2) Exhaustion assessed by self-reported fatigue; 3) Decreased handgrip strength; 4) Low level of physical activity; and 5) Decreased walking speed. The elderly were classified as fragile, pre-fragile, and non-fragile. In the fragile stage, the elderly who presented three or more components of the phenotype; in the pre-fragile stage, presented one or two components of the phenotype; and non-fragile when the elderly did not present any of the components (Fried *et al*., 2001). Only the study by Sousa *et al*. (2018) performed the joining of the pre-fragile and non-fragile categories. In the study by Hajek *et al*., (2020) frailty was assessed using the Clinical Frailty Scale, developed by a group of Canadian researchers on health and aging (Rockwood *et al*., 2005). The scale consists of the summation of deficits observed in different measures of signs, symptoms, functional disability, morbidities, laboratory measures (Kulminski *et al*., 2006; Rockwood *et al*., 2007).

The Clinical Fragility Scale, ranges from 1 (very fit) to 7 (severely frail), being: (1) Very fit - robust; (2) Well - no active disease; (3) Well, with treated comorbidity; (4) Apparently vulnerable - although not frankly dependent; (5) Mildly frail - with limited dependence on others for Activities of Daily Living (ADLs); (6) Moderately frail - help is needed with instrumental and non-instrumental activities of daily living; and (7) Severely frail - completely dependent on others for activities of daily living, or terminally ill (Rockwood *et al*., 2005). Based on the reading of the selected articles, it was possible to identify the prevalence and factors significantly associated with frailty in longevous elderly.

Table 1 presents for each study included in the review, the prevalence of frailty and the factors associated with this condition. The prevalence of frailty among the longevous elderly ranged from 12.4% to 64.7%. As for the associated factors, the studies presented associations between frailty and sociodemographic variables: sex, increasing age, and living in a long-stay institution; clinical variables: increase in chronic conditions, dyslipidemias, metabolic diseases, depression, dementia, and hearing impairment; and health conditions: hospitalization in the last 12 months, disability for ≥ 2 ADLs, and falls.

DISCUSSION

This review study evaluated the prevalence of frailty in longevous elderly and identified sociodemographic, clinical factors, and health conditions that influence prevalence estimates among the elderly. The prevalence of frailty ranged from 12.4% to 64.7%. Lower prevalence of frailty was observed in the study of Hajek *et al*., (2020) when using Clinical Frailty Scale (Rockwood *et al*., 2005) in a prospective cohort study when compared to the other studies with cross-sectional design and using the frailty phenotypes of Fried *et al*., (2001). In this context, it is observed that the frailty assessment method was shown to significantly affect the prevalence of frailty, which is consistent with the results found in a systematic review conducted with cross-sectional and prospective studies from Brazil with samples of non-institutionalized elderly aged 60 years or older (Melo *et al*., 2020). Among the sociodemographic variables associated with frailty in longevous elderly, gender, increasing age, and residing in a long-term care facility were associated with frailty in longevous elderly. Regarding gender, the findings of the study by Herr *et al*., (2018), and which was included in this review, concluded that there is a significant association between frailty and male gender. However, studies of elderly people in South Korea (Wu *et al*., 2018) and China (Jung *et al*., 2020) concluded that the prevalence of frailty was significantly higher in women than in men, contradicting the findings of Herr *et al*., (2018). In this context, the literature reinforces that there is a higher prevalence of frailty in female elderly, and that this can be explained by the greater physiological loss of muscle mass with aging, in addition to the fact that women are more prone to developing sarcopenia, which is an intrinsic risk for frailty (Liberalesso *et al*., 2017).

Frailty has been shown to become more prevalent as people age, which is already well established in the literature, as with increasing age there is an accelerated decline in physiological reserve and homeostatic mechanisms. With this, there is a continuous loss of strength and aerobic endurance, which causes decreased functional independence and makes the elderly frail (Fhon *et al*., 2018; Feitosa *et al*., 2020; Wang *et al*., 2021). Moreover, after the age of 80, people accumulate deficits and become more vulnerable to adverse health outcomes. Studies conducted by Feitosa *et al*., (2020) and Wang *et al*., (2021) corroborate the findings of the present study, that with advancing age, frailty also increases, since the results pointed out that older people with a higher age range presented themselves more frail when compared to younger people. Corroborating, a systematic review showed that the prevalence of frailty in the age group of 80 - 84 years and ≥ 85 years was 29.8% and 34.0%, respectively, which practically doubled the rate when compared to individuals aged 70 - 74 years (14.4%) and 75 - 79 years (19.2%) (Para *et al*., 2022). Frailty has also been observed to be associated with seniors residing in long-stay institutions (Herr *et al*., 2018). Frail and pre-frail elderly are approximately 5 and 3 times more likely to be institutionalized, respectively, compared to those who are not frail (Kojima, 2018). The prevalence of frailty among community-dwelling seniors is approximately 10% (Collard *et al*., 2012) while rates in seniors residing in long-stay institutions, frailty reaches up to 50% of those institutionalized (Kojima, 2015). This association may be related to clinical conditions of the elderly, which were also associated with frailty in this study. The presence of chronic conditions, dyslipidemias, metabolic diseases, depression, dementia, and sensory impairments have been associated with frailty in longevous elderly (Sousa *et al*., 2018; Herr *et al*., 2018; Hajek *et al*., 2020). Although the presence of chronic diseases is not accompanied by frailty, it predisposes the elderly to increased clinical-functional vulnerability (Oliveira *et al*., 2021). Evidence shows that the elderly with loss of interest in previously pleasurable activities and mood swings become depressed, since depression is associated with dependence and loss of autonomy (Vaughan; Corbin; Goveas, 2015; Oliveira *et al*., 2021), leading the elderly to a situation of frailty. A recent study by Ward *et al*., (2022) noted that frailty was associated with a substantial increase in dementia risk independent of genetic risk; and nearly half of the relationship between healthy lifestyle behaviors and dementia risk was mediated by frailty. Kojima (2018) corroborates with a systematic review showing that frailty is associated with worse cognitive function and to predict incident mild cognitive impairment and dementia. As for the association between frailty and sensory impairments (visual and hearing), it can be explained by the increased risk of falls, disability, and institutionalization among people with sensory impairments (Linard *et al*., 2016; Campos *et al*., 2022). Studies show independent and combined associations of visual and hearing impairment with frailty in the elderly (Liljas *et al*., 2017a; Liljas *et al*., 2017b; Zhao *et al*., 2022). With regard to health conditions related to frailty, there was an association with hospitalization in the past 12 months, disability for ≥ 2 DLAs, and falls. Staying in a hospital environment can expose the elderly to other diseases, occurrence of adverse events that can further debilitate their health and functional status with consequent disabilities for DLAs and falls (Herr *et al*., 2018). Indicators of frailty not only predict disability for ADLs when they are related in a frailty phenotype, but are also independent of each other (Vermeulen *et al*., 2011).

The elderly population is commonly studied in several areas of knowledge, since this age group is prone to the development of age-related events, including frailty. Although the findings of the present review bring an important overview of the prevalence of frailty in longevous elderly, it is important to highlight as a methodological limitation of the present study the non-comparison of frailty with the different instruments available to assess this outcome, and neither with the younger elderly population, since the studies analyzed here deal with this theme exclusively in the longevous elderly population (≥ 80 years) - anyway, studies on frailty often focus on younger elderly people and not the longevous ones (Carneiro *et al*, 2017; Duarte *et al*., 2018; Grden *et al*., 2019; Oliveira *et al*., 2022). Thus, the importance of the results presented here in the national and international panorama regarding the particularities of frailty in the elderly, and the details of assessment in the longevous elderly population is highlighted, elucidating the complexity of the phenomenon and drawing attention to the need for attention and care to the longevous elderly in order to improve the quality of life of this population group.

FINAL CONSIDERATIONS

Through this review it was possible to observe a high prevalence of frailty in longevous elderly. An association between frailty and sociodemographic, clinical variables and health conditions was evidenced. It was observed a scarcity of studies, in the last five years, that assesses the frailty of elderly individuals older than 80 years. In this sense, it is recommended that future studies be carried out in search of more robust results that provide support for interventions to prevent or reduce frailty in longevous elderly individuals.

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