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REVIEW ARTICLE

Prevalence of frailty syndrome in Brazil: a systematic review

Prevalência da síndrome da fragilidade no Brasil: uma revisão sistemática

Daiene de Morais Fabrício[1,2], Bruna Moretti Luchesi[3], Tiago da Silva Alexandre[4], Marcos Hortes Nisihara Chagas[1,2,4,5]

[1]*Postgraduate Program in Psychology, Universidade Federal de São Carlos (UFSCar) - São Carlos (SP), Brasil.*
[2]*Department of Psychology, Universidade Federal de São Carlos (UFSCar) - São Carlos (SP), Brasil.*
[3]*Undergraduate Course in Medicine and Postgraduate Program in Nursing, Universidade Federal de Mato Grosso do Sul (UFMS) - Três Lagoas (MS), Brasil.*
[4]*Department of Gerontology, Universidade Federal de São Carlos (UFSCar) - São Carlos (SP), Brasil.*
[5]*Instituto Bairral de Psiquiatria - Itapira (SP), Brasil.*

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Abstract

Background: The population is aging rapidly, which leads to an increased prevalence of frailty syndrome. A large number of investigations on the subject have been conducted in Brazil, but no systematic review of prevalence studies involving the Brazilian population has been carried out considering the characteristics of the sample and the evaluation methods used. **Objective:** To develop a systematic review of studies that assess the prevalence of frailty syndrome in Brazil, analyzing the clinical and demographic characteristics of the samples and the methods used for the diagnosis of the syndrome. **Method:** The searches were carried out in the PubMed, SciELO and Web of Science databases using the following keywords: *(prevalence or epidemiology)* and *frailty* and *Brazil*. **Results:** Forty-seven articles met the eligibility criteria and were included in the review. The prevalence of frailty ranged from 3.85% to 74.1%, depending on the assessment instrument used, context, region and population studied. **Conclusion:** The prevalence data are discrepant, and the standardization of screening methods for the frailty syndrome could facilitate the comparison between studies, in order to maximize and create intervention strategies, especially in a country with cultural diversity and regional disparities, such as Brazil

Keywords: frailty; epidemiology; aging; elderly; systematic review.

Resumo

Introdução: A população está envelhecendo rapidamente, o que leva a um aumento da prevalência da síndrome da fragilidade. Um grande número de investigações sobre o tema tem sido conduzido no Brasil, mas nenhuma revisão sistemática de estudos de prevalência envolvendo a população brasileira foi realizada, considerando as características da amostra e os métodos de avaliação utilizados. **Objetivo:** Desenvolver uma revisão sistemática de estudos que avaliam a prevalência da síndrome da fragilidade no Brasil, analisando as características clínicas e demográficas das amostras e os métodos utilizados para o diagnóstico da síndrome. **Método:** As pesquisas foram realizadas nas bases de dados do PubMed, SciELO e Web of Science usando as seguintes palavras-chave: *(prevalence or epidemiology)* and *frailty* and *Brazil*. **Resultados:** Quarenta e sete artigos preencheram os critérios de elegibilidade e foram incluídos na revisão. A prevalência de fragilidade variou de 3,85% a 74,1%, dependendo do instrumento de avaliação utilizado, contexto, região e população estudada. **Conclusão:** Os dados de prevalência são discrepantes, sendo que a padronização dos métodos de triagem para a síndrome da fragilidade poderia facilitar a comparação entre os estudos, a fim de maximizar e criar estratégias de intervenção, especialmente em um país com diversidade cultural e disparidades regionais, como o Brasil.

Palavras-chave: fragilidade; epidemiologia; envelhecimento; idoso; revisão sistemática.

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Correspondence: Daiene de Morais Fabrício. E-mail: daienemorais1@gmail.com
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INTRODUCTION

Brazil is undergoing a process of continual population change with the restructuring of the age pyramid. In 2016, the life expectancy of Brazilians reached 75.7 years and is expected to be as high as 78.6 years by 2030[1]. One of the consequences of the aging of the population is an increase in the prevalence of frailty syndrome although an increase in age is not synonymous with becoming frail[2]. The first discussions involving the term frailty began in the 1980s with the aim of describing individuals with disabilities and comorbidities that were not necessarily related to the advance in age[3]. Therefore, the term frailty was long understood as being synonymous with comorbidities, the presence of crippling diseases and a greater risk of death. In the 1990s, a group of authors investigated the relationship between adverse health outcomes and major geriatric syndromes (disability, incontinence, postural instability, iatrogenesis, and social isolation) in 985 older adults[4]. The authors classified disabled individuals and seniors at higher risk of death as frail and seniors without functional loss as non-frail[4]. Subsequently, new criteria were established for the definition of the frailty syndrome to be successful[5]. This set of criteria should consider content validity (it should be dynamic, multifactor and applicable in different contexts); construct validity (it should be operationalized with other measures, such as age, sex, and comorbidities) and criterion validity (it should have the capacity to predict adverse outcomes). A large number of models currently meet these criteria for screening frailty syndrome[6]. Considering the multidimensional aspects of frailty were validated by the Edmonton Frail Scale, which addresses the following aspects: cognition, general health state, functional independence, social support, use of medications, nutrition, mood, continence, and functional performance[7]. In 2001, a group of researchers defined frailty syndrome as a state of physiological vulnerability associated with aging that results from a diminished homeostatic reserve and difficulty in adequately responding to stressors[8]. Thus, a frail individual has three or more of the following biological components: unintentional weight loss (more than 4.5 kg or 5% of body weight in the previous year), self-reported fatigue, muscle weakness, a low level of physical activity and slow gait[8].

Frailty syndrome is, therefore, a complex construct that is measured with different methods. However, some concepts have been established in the literature on this issue: frailty is a clinical syndrome, with a multidimensional nature; a frail individual is more susceptible to stressors; frailty can be reversed or attenuated through interventions; for such, health professionals must detect the syndrome as early as possible[6,9]. Moreover, all methods foresee the same adverse effects: the aggravation of diseases, cognitive and functional decline, hospitalization and death[10].

The prevalence of frailty syndrome throughout the world ranges from 5% to 58%[11]. The differences in prevalence rates may be related to factors such as the region and population studied, sample size and the assessment tools employed for the identification of frailty. In Brazil, an increasing number of studies on this topic have been published. However, there is no systematic review of prevalence studies conducted in the country considering the characteristics of the population studied and the assessment tools employed. Thus, the present study investigates whether there is a unified method for screening for frailty syndrome in Brazil and how the prevalence of the syndrome differs when analyzing the characteristics of different studies. Comparing the syndrome screening method with the characteristics of the samples evaluated in the studies will contribute not only to a better understanding of the prevalence of frailty syndrome in the country, but also to the planning of strategies and public policies aimed at the care of these older people.

Therefore, the present study aimed to perform a systematic review of studies that evaluate the prevalence of frailty syndrome in Brazil, analyzing the clinical and demographic characteristics of the samples as well as the methods used for the diagnosis of the syndrome.

METHOD

Search strategy and selection criteria

The following were the guiding questions of this systematic review: "What is the prevalence of frailty syndrome in Brazil?", "What are the methods chosen by researchers to assess the syndrome?" and "What are the characteristics of the samples evaluated?".

The search strategy of this systematic review was created and implemented prior to study selection according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Checklist[12]. The US National Library of Medicine (PubMed), Scientific Electronic Library Online (SciELO) and Web of Science databases were searched for relevant articles using the following keywords: *(prevalence or epidemiology)* and *frailty* and *Brazil*. The reference lists of the selected articles were also searched for additional sources. The inclusion criteria were original articles conducted in Brazil that evaluated the prevalence of frailty syndrome. No restriction was imposed with regard to the year of publication and language. Searches were conducted up to September 2019. Studies published that did not report prevalence rates were excluded. Letters to the editor, book chapters, book reviews, comments, notes, errata, theses, dissertations, and bibliographic/systematic reviews were also excluded. Articles that did not use the concepts already established in the literature about frailty syndrome[6,9] or that were carried out from the same database were also excluded.

The articles retrieved during the database search were submitted to an analysis of the title and abstract for inclusion based on the eligibility criteria. Two independent researchers performed the search in the databases, extracted and documented the following information from the selected articles: authorship and year of publication; study setting; study design; sample size and demographic characteristics; age and schooling of participants; and assessment tools employed to screen for frailty syndrome. Divergences of opinion between the reviewers were discussed until a consensus was reached. The "Mendeley" reference manager was used to identify duplicate articles in the databases.

The baseline characteristics of the studies were evaluated for individual quality. To do so, we use a tool for cross-sectional studies[13]. The tool is composed of ten items that evaluate the external validity, selection, and domain of response bias, internal validity, measurement bias, and analysis. In the end, the study may be classified as low risk (score 0-3), moderate risk (4-6), or high risk (7-9).

The review was registered in the International Prospective Register of Systematic Reviews (PROSPERO). CDR: 42018095741.

RESULTS

Study selection

Figure 1 displays the search and selection process of the articles included in the present systematic review.

Of the 47 articles selected, only one[14] presented a moderate risk of bias. All other articles scored between 0 and 3 (low risk). Taking into account that this article[14] presented a moderate risk of bias due only to the small sample size and low response rate of <75%, we chose to keep the manuscript among the selected articles, assuming that its inclusion could provide more grounds for understanding how studies that assess frailty syndrome are carried out in Brazil. Thus, no articles were excluded from the review. Although two articles with longitudinal design were included in the sample, we analyzed the main methodological bases of this design to measure quality.

Characteristics of the studies

Two hundred and eight articles were retrieved during the database searches, 109 of which were excluded following the analysis of the title and abstract. Thus, 47 articles met the eligibility criteria and were included in the present systematic review[14-60]. Tables 1 and 2 displays the characteristics of each study. Table 1 displays the characteristics of 31 studies (66%) that used the phenotype of the five biological components[8] for the determination of the syndrome[14-44]. Table 2 displays the characteristics of 16 studies (34%) in which other assessment tools were employed[45-60].

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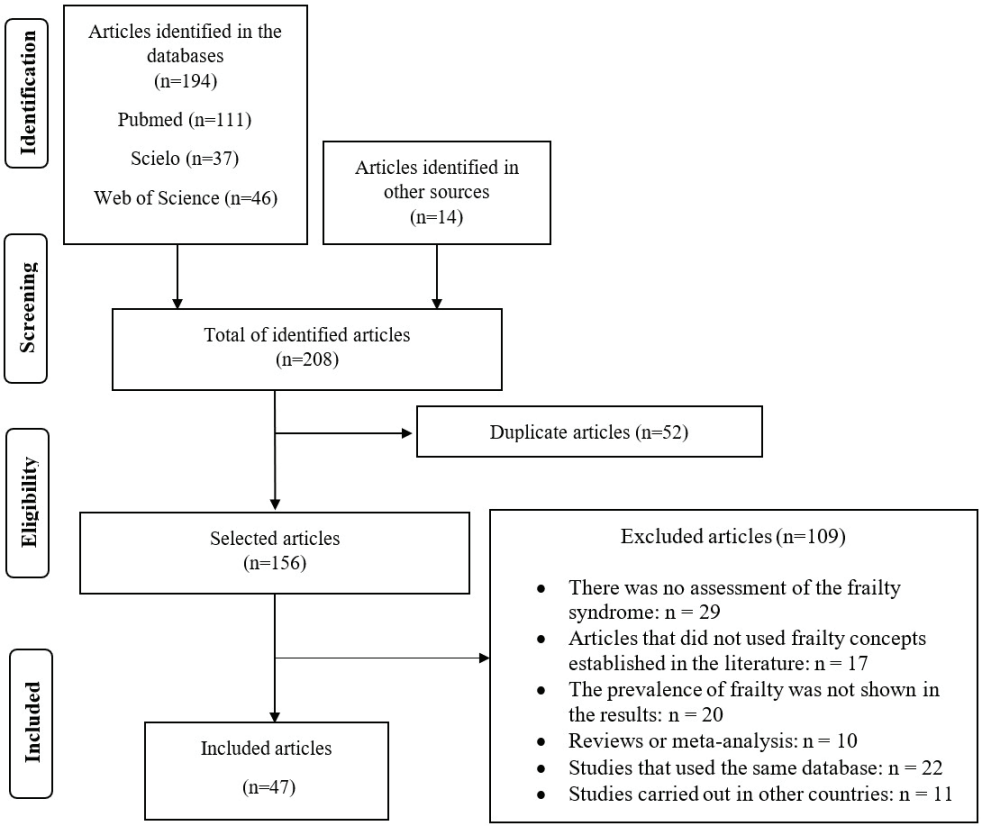

Figure 1. Flowchart following recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement[12]

The majority of the included studies (57.4%) were published over the past five years[17-19,21,23,25,26,28,29,31,32,37,38,40-47,49,51,53,57-59]. The sample size ranged from 30[14] to 8556 participants[17]. With regards to the study design, only one was a longitudinal study[57], and one was a prospective cohort study[58].

The majority of studies were conducted in the southeastern (61.7%)[14-16,22,23,25-27,32,33,35,36,38-42,44-47,50,52,55-60] and northeastern (19.1%)[20,24,28,30,34,37,43,48,54] regions of Brazil. Seven studies (14.9%) were conducted in the southern region[18,21,29,31,49,51,53]. Two studies were conducted in all five (northern, northeastern, central western, southeastern and southern) regions of the country[17,19] and one study was conducted in both the southeastern and central western regions[60].

The prevalence of frailty ranged from 3.85%[55] to 59.0%[15] among the studies conducted in the southeastern region; 16.9%[37] to 74.1%[54] among the studies conducted in the northeastern region, with one study reporting a combined prevalence rate of frailty and pre-frailty of 85.71%[28]; and 28.1%[20] to 43.4%[49] among the studies conducted in the southern region, with one study reporting a combined prevalence rate of frailty and prefrailty of 70.8%[18]. Two studies[51,53] used the Edmonton Frail Scale and one of them found that 1.2% of the individuals presented severe frailty (score of 11-17 on the 17-point scale), 8.6% light frailty (7-8 points), 4.0% moderate frailty (9-10 points) and 16.7% were vulnerable (5-6 points)[51]. The other study found that 3% of the individuals exhibited moderate frailty and 16% were apparently vulnerable[53]. In the study conducted in the southeastern and central-western regions of Brazil, the prevalence of frailty was 52.0%[60]. In the two studies conducted in all five regions of Brazil, one of them found that 11.2% of individuals were frail, with no prevalence rate given for each region separately[19]. The other study showed the prevalence of frailty in each age group, so that in the group of individuals aged 50 years or over, the prevalence of frailty was 9.0%, in the group aged 60 or over 13.5% and, in the group aged 65 or over 16.2%[17].

Table 1. Studies that evaluated the frailty syndrome according to the five biological components proposed by Fried et al.[8]

Study	Sample	Participants	Design	Aim	Study city	Prevalence of frailty	Components of frailty
Abreu da Silva e D'Elboux; 2012[15]	100 older adults attended a Geriatrics Outpatient Clinic	Sex: Female: 74% Male: 26% Age: 41% with 80 years or more Schooling: 49% with less than 4 years of study	Cross-sectional	To analyze the factors associated with urinary incontinence among elderly people who meet frailty criteria (pre-frail and frail)	Campinas (SP)	Frail: 59% Pre-frail: 41%	Not explored
Alvarado et al.[16]	2143 community older adults	Sex: Female: 58.9% Male: 41.1% Age: not explored Schooling: 29.3% illiterate women and 21.1% illiterate men	Cross-sectional	To check if health and social conditions are associated with frailty; To verify if the differential exposure and/or vulnerability of women and men to life-course conditions may explain gender differences in frailty	São Paulo (SP)	Frail: 40.6% Pre-frail: 48.8% Non-frail: 10.6%	Low level of physical activity: Women: 78.7% Men: 75.1% Muscle weakness: Women: 51.9% Men: 51.0% Reduced walking speed: Women: 48.2% Men: 35.9%
Andrade et al.[17]	8556 indivíduos com 50 anos ou mais residentes em comunidades de cinco regiões brasileiras	Sex: Female: 53.4% Male: 46.6% Age: 62.7 (95%CI 61.9–63.5) Schooling: 31.8% with up to three years of study	Cross-sectional	To estimate the prevalence of frailty and to evaluate the associated factors in the non-institutionalized Brazilian population aged 50 years or older	Seventy cities in the five Brazilian regions	Frail: 9% (group aged 50 or over); 13.5% (group aged 60 or over) and 16.2% (group aged 65 or over)	Weight loss: 7.4% Reduced walking speed: 20.5% Muscle weakness: 22.6% Fatigue: 28.6% Low level of physical activity: 19.8%
Closs et al.[18]	439 older adults registered in a Family Health Unit	Sex: Female: 63.8% Male: 36.2% Age: 68.7 (±7.2) Schooling: 41.7% with up to 4 years of study	Cross-sectional	To verify the discriminatory performance of anthropometric measures in identifying frailty in the elderly and to create an easy-to-use tool	Porto Alegre (RS)	Frail + pre-frail: 70.8% Non-frail: 29.2%	Not explored
Silva et al.[14]	30 older adults registered at a geriatric outpatient clinic	Sex: Female: 66.7% Male: 33.3% Age: 75.7 (±7.6) Schooling: 40% with more than 4 years of study	Cross-sectional	To determine the frequency of frailty and to search for correlations between frailty and falls, fear of falling, and functionality	Juiz de Fora (MG)	Frail: 20% Pre-frail: 46.6% Non-frail: 33.4%	Not explored

Table 1. Continued...

Study	Sample	Participants	Design	Aim	Study city	Prevalence of frailty	Components of frailty
Silva et al.[19]	5532 community older adults	Gender Female: 65.6% Male: 34.4% Age: 73.1 (±6.2) Education: not explored	Cross-sectional	To evaluate the contribution of each item to determine the frailty syndrome among elderly Brazilians	Barueri (SP), Belém (PA), Belo Horizonte (MG), Campinas (SP), Cuiabá (MT), Ermelindo Matarazzo (SP), Fortaleza (CE), Ivotí (RS), Juiz de Fora (MG), Parnaíba (PI), Poços de Caldas (MG), Recife (PE), Ribeirão Preto (SP) and Santa Cruz (RN)	Frail: 11.2% Pre-frail: 51% Non-frail: 37.8%	Muscle weakness: 20.6% Reduced walking speed: 20.9% Low level of physical activity: 27.5%
Câmara et al.[20]	64 community older adults	Sex: Female: 50% Male: 50% Age: 69.53 (±2.95) Schooling: 40.6% illiterate	Cross-sectional	To analyze the Short Physical Performance Battery's (SPPB) ability in screening for frailty in community-dwelling young elderly from cities with distinct socioeconomic conditions	Santa Cruz (RN)	Frail: 28.1% Pre-frail: 54.7% Non-frail: 17.2%	Muscle weakness: 48.4% Fatigue: 37.5% Reduced walking speed: 65.6%
Amorim et al.[21]	258 elderly workers from a public university	Sex: Female: 42.2% Male:57.8% Age: 62.9 (±2.47) Schooling: 58.5% higher education and post-graduation	Cross-sectional	To estimate the prevalence of sarcopenia and frailty, and their individual and occupational factors among elderly individuals	North Paraná	Frail: 9.4% Pre-frail: 62.5% Non-frail: 28.1%	Not explored
Andrade et al.[22]	1374 community older adults	Sex: Female: 59.7% Male: 40.3% Age: 58.4% with 60 to 69 years. Schooling: 41.8% with) less than 4 years of study	Cross-sectional	To test the hypothesis that clinical oral health conditions are associated with frailty independent of socioeconomic and general health status	São Paulo (SP)	Frail: 8.5% Pre-frail: 40.7% Non-frail: 50.8%	Not explored
Morais et al.[23]	187 elderly caregivers registered in a Family Health Unit	Sex: Female: 80.7% Male: 19.3% Age: 68.95 (±7.07) Schooling: 4.13 years (±3.62)	Cross-sectional	To determine whether there are differences in the intensity of chronic pain of elderly caregivers who are frail, pre-frail and non-frail	São Carlos (SP)	Frail: 24.1% Pre-frail: 55.1% Non-frail: 20.9%	Not explored
Santos Amaral et al.[24]	300 community older adults	Sex: Female: 67.3% Male: 32.7% Age: 74.3 (± 6.9) Schooling: 4.7 years (± 3.8)	Cross-sectional	To analyze the association between social support and frailty syndrome among elderly residents in the community	Natal (RN)	Frail: 18.3% Pre-frail: 54.3% Non-frail: 25.7%	Weight loss: 30.7% Fatigue: 38.7% Low level of physical activity: 26.7%

Table 1. Continued...

Study	Sample	Participants	Design	Aim	Study city	Prevalence of frailty	Components of frailty
Santos Tavares et al.[25]	255 hospitalized older adults	Sex: Female: 38.8% Male: 61.2% Age: 68.7 (±6.6) Schooling: 56.3% with between 1-4 years of study	Cross-sectional	To identify the prevalence of frailty among hospitalized elderly people in a Clinic Hospital and to verify the association between socioeconomic and clinical characteristics with the state of frailty	Uberaba (MG).	Frail: 26.3% Pre-frail: 53.3% Non-frail: 23.4%	Not explored
Santos Tavares et al.[26]	1609 community older adults	Sex: Female: 64.4% Male: 35.6% Age: 44% with between 70 and 79 years old Schooling: 52% with 1 to 4 years of study	Cross-sectional	To investigate the association between the frailty syndrome and socioeconomic and health variables	Uberaba (MG)	Frail: 13.6% Pre-frail: 51.9% Non-frail: 34.4%	Not explored
Assis Faria[27]	847 older adults clients of a private health care plan	Sex: Female: 66.9% Male: 33.1% Age: 76.7 Schooling: 31.8% with 9 to 12 years of study	Cross-sectional	To investigate the association between frailty syndrome and cognitive performance in older adults and the effect of schooling and age on this association	Rio de Janeiro (RJ)	Frail: 9.2% Pre-frail: 46.5% Non-frail: 44.3%	Not explored
Ferreira et al.[28]	63 institutionalized older adults	Sex: Female: 79.4% Male: 20.6% Age: median of 79 years Schooling: 55.5% illiterate	Cross-sectional	To estimate the prevalence of falls in elderly residents in 10 long-stay institutions registered in the Health Surveillance, as well as to establish associations between elderly mobility and falls	Natal (RN)	Frail + pre-frail: 85.71% Non-frail: 14.28%	Not explored
Gross et al.[29]	555 older adults registered in Family Health Units	Sex: Female: 60.9% Male:39.1% Age: 71.1(±8.3) Schooling: 65% have not completed elementary school	Cross-sectional	Verify the association between frailty in the elderly and sociodemographic characteristics	Northwest of the State of Rio Grande do Sul	Frail: 17.7% Pre-frail: 45.4% Non-frail: 36.9%	Fatigue: 31.89% The prevalence of the other components ranged from 14.9% (weight loss) to 18% (muscle weakness)

Table 1. Continued...

Study	Sample	Participants	Design	Aim	Study city	Prevalence of frailty	Components of frailty
Reis et al.[30]	236 community older adults	Sex: Female: 58.9% Male: 41.1% Age: 69.5% with 60-79 years Schooling: 68.2% could not read and write a message	Cross-sectional	To identify the prevalence and factors associated with the pre-frailty and frailty of the elderly living in a community with a low Human Development Index (HDI)	Lafaiete Coutinho (BA)	Frail: 23.8% Pre-frail: 57.8% Non-frail: 18.4%	Not explored
Liberalesso et al.[31]	69 octogenarians, nonagenarians and centenarians community older adults	Sex: Female: 62.3% Male: 37.7% Age: 85.0 (±5.6) Schooling: 73.9% with more than 8 years of study	Cross-sectional	To investigate the prevalence of frailty in a long-lived population	Erval Seco (RS)	Frail: 58% Pre-frail: 42%	Reduced walking speed: 100% Weight loss: 66.7% Fatigue: 65.2% Low level of physical activity: 23.2% Muscle weakness: 4.3%
Mello et al.[32]	137 community older adults	Sex: Female: 67.9% Male: 32.1% Age: 70.2 (±7.4) Schooling: 58.4% with 1 to 7 years	Cross-sectional	To describe anthropometric and feeding data related to frailty syndrome in the elderly	Manguinhos (RJ)	Frail: 12.4% Pre-frail: 61.3% Non-frail: 26.3%	Muscle weakness: 23.4% Fatigue: 33.6% Weight loss: 21.2%
Moreira e Lourenço[33]	754 community older adults	Sex: Female: 66.9% Male: 33.1% Age: 76.6 (±6.9) Schooling: 10.02 years (±5)	Cross-sectional	To determine the prevalence of frailty and its association with social and demographic factors, functional capacity, cognitive status and self-reported comorbidities	Rio de Janeiro (RJ)	Frail: 9.1% Pre-frail: 47.3% Non-frail: 43.6%	Weight loss: 30.2% Muscle weakness: 24.1%
Nóbrega et al.[34]	69 institutionalized older adults	Sex: Female: 62.3% Male: 37.7% Age: 77.5 (±7.8) Schooling: 4.6 years (±4.3)	Cross-sectional	To evaluate the relationship between sleep and frailty syndrome in residents of long-stay institutions	João Pessoa (PB)	Frail: 49.3% Pre-frail: 45% Non-frail: 5.7%	Not explored
Pegorari et al.[35]	51 older adults registered in the Family Health Unit	Sex: Female: 43.3% Male: 56.7% Age: 73 (±6) Schooling: 74.5% primary level	Cross-sectional	To evaluate the impact of frailty on respiratory function in a community-dwelling elderly.	Uberaba (MG)	Frail: 9.8% Pre-frail: 47.1% Non-frail: 43.1%	Weigh loss: 31.4% Reduced walking speed: 23.5% Low level of physical activity: 19.6%

Table 1. Continued...

Study	Sample	Participants	Design	Aim	Study city	Prevalence of frailty	Components of frailty
Ramos Oliveira et al.[36]	99 institutionalized older adults	Sex: Female: 50.5% Male: 45.5% Age: 74.5 (±6.8) Schooling: 5.2 years (±4.5)	Cross-sectional	To measure the prevalence of the frailty syndrome in the elderly in a hospital, regarding socio-demographic, clinical and anthropometric variables	São Vicente (SP)	Frail: 46.5% Pre-frail: 49.5% Non-frail: 4%	Frail: Low level of physical activity: 77.8% Reduced walking speed: 77.5% Pre-frail: Muscle weakness: 44.3% Fatigue: 34.5%
Santos et al.[37]	139 older adults registered in the Family Health Unit	Gender: Female: 75.5% Male: 24.5% Age: 72,32 (±8.4) Schooling: 73.1% illiterate or did not finish high school	Cross-sectional	To identify the profile of fragility and associated factors among the elderly registered in a Family Health Unit	Jequié (BA)	Frail: 16.9% Pre-frail: 61.8% Non-frail: 21.3%	Not explored
Santos-Orlandi et al.[38]	40 elderly caregivers of other elderly and registered in a Family Health Unit	Sex: Female: 67.5% Male: 32.5% Age: 70.1 (±8.2) Schooling: 40% with 1-4 years of with 1-4 years of study	Cross-sectional	To identify the prevalence of frailty in elderly caregivers inserted in a context of high social vulnerability and its correlation with sociodemographic and health aspects	São Carlos (SP)	Frail: 10.0% Pre-frail: 50.0% Non-frail: 40.0%	Not explored
Tribess e Oliveira[39]	622 community older adults	Sex: Female: 65% Male: 35% Age: 71.1 (±7.8) Schooling: 40.3% had up to 2 years of study	Cross-sectional	To analyze the predictive power and identify the cutoffs of physical activity, in its different domains, for the absence of frailty in the elderly of both gender	Uberaba (MG)	Frail: 19.9% Non-frail: 80.1%	Not explored
Viana et al.[40]	53 older adults users of a health service	Sex: Female: 75% Male: 25% Age: 76.72 (±5.89) Schooling: not explored	Cross-sectional	To evaluate whether the indirect indicators of sarcopenia and functionality influence the frailty profile in elderly subjects	Belo Horizonte (MG)	Frail: 15.1% Pre-frail: 54.7% Non-frail: 30.2%	Low level of physical activity: 41.5% Reduced walking speed: 39.6%

Table 1. Continued...

Study	Sample	Participants	Design	Aim	Study city	Prevalence of frailty	Components of frailty
Virtuoso et al.[41]	624 community older adults	Sex: Female: 65.1% Male: 34.9% Age: 71 (±7.77) Schooling: 40,3% had a maximum of two years of study	Cross-sectional	To estimate the prevalence and factors associated with functional disability in the elderly people	Uberaba (MG)	Frail: 37.1% Pre-frail: 16.8% Non-frail: 6.4%	Not explored
Zazzetta et al.[42]	304 community older adults	Sex: Female: 56.9% Male: 43.1% Age: 70.1 (±7.6) Schooling: 2.5 years (±2.6)	Cross-sectional	To investigate a vulnerable population living in the context of poverty in a Brazilian municipality, in order to identify the factors associated with the frailty syndrome in the elderly	São Carlos (SP)	Frail: 27.3% Pre-frail: 60.5% Non-frail: 12.2%.	Not explored
Zeballos et al.[43]	201 individuals living with HIV, aged 50 years or older at University Hospital Professor Edgard Santos (HUPES)	Sex: Female: 63.7% Male: 36.3% Age: 55.0 (range 50 to 83 years) Schooling:51.7% with higher education	Cross-sectional	To determine the prevalence and factors associated with frailty and to define the impact of frailty on quality of life	Salvador (BA)	Frail: 19.4% Pre-frail: 49.3% Non-frail: 31.3%	Most common low physical activity: 38.8% Fatigue: 34.8% and Muscle weakness: 32.3%
Zukeran et al.[44]	254 older adults from a geriatric secondary care outpatient clinic	Sex: Female: 70% Male: 30% Age: Non-frail: 73.6 (±5.7); Pre-frail: 75.3 (±7.2); Frail: 78.9 (±7.6) Schooling: Not explored	Cross-sectional	To investigate, in elderly individuals registered at a secondary outpatient clinic, the prevalence of frailty and pre-frailty and to identify the discriminatory power of anthropometric measurements and nutritional risk in identifying these conditions	Southeast of São Paulo	Frail: 31.1% Pre-frail: 53.5% Non-frail: 15.4%	Not explored

Table 2. Studies that evaluated the frailty syndrome using other instruments

Study	Sample	Participants	Design	Aim	Study city	Instrument used for screening frailty	Prevalence of frailty	Components of frailty
Almeida Carneiro et al.[45]	511 community older adults	Sex: Female: 64.0% Male: 36.0% Age: 74 (±7.14) Schooling: 80.4% with up to 4 years	Cross-sectional	To verify the prevalence and factors associated with frailty in non-institutionalized elderly people	Minas Gerais (MG)	EFS	Frail: 41.3% (severe, moderate or mild)	Not explored
Aprahamian et al.[46]	124 older adults attended two university-based geriatric outpatient units	Sex: Female: 83% Male: 17% Age: 78.6 (±7.1) Schooling: 7.7 years (±5.2)	Cross-sectional	To investigate the diagnostic accuracy of the Brazilian version of the Frailty Scale with the CHS frailty phenotype in a sample derived from 2 geriatric outpatient units	São Paulo (SP) and Campinas (SP)	Frailty Scale + CHS (Fried et al. 2001)	FRAIL-BR: Frail: 23.3% Non-frail: 20.16% Fried et al, 2001: Frail: 14.3% Non-frail: 24.19%	Not explored
Cezar et al.[47]	66 older adults (40 with MCI and 26 healthy) from a Psychogeriatric Outpatient Clinic	Sex: Female: 85% MCI group and 73.0% healthy group Male: 15% MCI group and 26.9% healthy group Age: MCI group: 77.0 (±5.6) Healthy group: 75.3 (±4.6) Schooling: MCI group: 9.7 years (±5.3). Healthy group: 11.9 years (±4.7)	Cross-sectional	To verify the prevalence and the presence of markers of frailty and its relation with the cognitive function among the elderly with amnestic MCI	São Paulo (SP)	CHS (Fried et al 2001) + EFS	CHS – MCI group: Frail: 30% Pre-frail: 70% Non-frail: 0% CHS – Control group: Frail: 26.93% Pre-frail: 65.38% Non-frail: 7.69% EFS – MCI group: Frail: 7,5% Pre-frail: 62.5% Non-frail: 30% EFS – Control group: Frail: 3.85% Pre-frail: 34.61% Non-frail: 61.54%	Not explored

CHS: Cardiovascular Health Study; EFS: Edmonton Frail Scale; MCI: Mild Cognitive Impairment; SOF: Study of Osteoporotic Fractures

Table 2. Continued...

Study	Sample	Participants	Design	Aim	Study city	Instrument used for screening frailty	Prevalence of frailty	Components of frailty
Costa Souto Duarte et al.[48]	166 elderly women in the community	Sex: 100% female Age: 73.2 (±8.9) Schooling: 6.5 years (±6.1)	Cross-sectional	To estimate the prevalence of frailty in elderly women; To identify possible associations between frailty and sociodemographic variables	João Pessoa (PB)	EFS	Frail: 39.1% (7.8% severe frailty, 7.8% moderate frailty, 23.5% light frailty) Apparently vulnerable: 21.7% Non-frail: 39.2%	Not explored
Llano et al.[49]	820 older adults registered in Family Health Units in rural areas	Sex: Female: 56.1% Male: 43.9% Age: 54.9% with 60-69 years Schooling: 52.7% with more than 3 years	Cross-sectional	To present an algorithm of care for frailty syndrome in the elderly	Pelotas (RS)	Self-reported instrument of Nunes et al.	Frail: 43.4% Pre-frail: 37% Non-frail: 19.5%	Not explored
Souza Orlandi e Dutra Gesualdo[50]	60 participants in a Renal Replacement Therapy Unit	Sex: Female: 30% Male: 70% Age: 71.1 (±6.9) Schooling: 36.7% with 1-4 years	Cross-sectional	To assess the level of the frailty of chronic renal disease patients undergoing Hemodialysis treatment	State of Sao Paulo, southeast region of Brazil	EFS	Frail: 38.3% (5% severe frailty, 13.3% moderate frailty, 20% light frailty) Apparently vulnerable: 26.7% Non-frail: 35%	Not explored
Farías-Antúnez et al.[51]	1399 community older adults	Sex: Female: 36.8% Male: 63.2% Age: 28.3% had ≥75 years Schooling: 31% had 4 to 7 years of study	Cross-sectional	To analyze the prevalence and factors associated with frailty in the elderly in the city of Pelotas, RS, Brazil, in 2014	Pelotas (RS)	EFS	Non-frail: 69.5% Vulnerable: 16.7% Mild frailty: 8.6% Moderate frailty: 4% Severe frailty: 1.2%	Not explored

CHS: Cardiovascular Health Study; EFS: Edmonton Frail Scale; MCI: Mild Cognitive Impairment; SOF: Study of Osteoporotic Fractures

Table 2. Continued...

Study	Sample	Participants	Design	Aim	Study city	Instrument used for screening frailty	Prevalence of frailty	Components of frailty
Fhon et al.[52]	240 community older adults	Sex: Female: 62.9% Male: 37.1% Age: 73.5 (±8.4) Schooling: 5.4 years (±5.0)	Cross-sectional	To analyze the prevalence of falls in frail elderly, their consequences and associated demographic factors	Ribeirão Preto (SP)	EFS	Frail: 39.2% (9.6% severe frailty, 11.3% moderate frailty, 18.3% light frailty) Apparently vulnerable: 24.6% Non-frail: 36.3%	Not explored
Grden et al.[53]	100 community older adults	Sex: Female: 93.0% Male: 7.0% Age: 60-65 years (59%) Schooling: 43% with 11-15 years	Cross-sectional	To investigate the association between physical frailty and cognitive scores in older adults at an Open University of the Third Age in Southern Brazil	Ponta Grossa (PR)	EFS	Moderate frailty: 3% Apparently vulnerable: 16% Non-frail: 81%	Not explored
Lira Borges et al.[54]	54 institutionalized older adults	Sex: Female: 38.9% Male: 61.1% Age: 42.6% with 80 years or more Schooling: 46.3% illiterate and 46.3% with up to 8 years	Cross-sectional	To evaluate the presence of frailty and its relation with sociodemographic and clinical characteristics in a group of institutionalized elderly	Fortaleza (CE)	EFS	Frail: 74.1% (37.5% light frailty, 35% moderate frailty and 27.5% severe frailty) Apparently vulnerable: 22.2% Non-frail: 3.7%	Not explored

CHS: Cardiovascular Health Study; EFS: Edmonton Frail Scale; MCI: Mild Cognitive Impairment; SOF: Study of Osteoporotic Fractures

Table 2. Continued...

Study	Sample	Participants	Design	Aim	Study city	Instrument used for screening frailty	Prevalence of frailty	Components of frailty
Lima Fernandes et al.[55]	128 older adults registered in a Family Health Unit	Sex: Female: 67.2% Male: 32.8% Age: 68.9 (±7.8) Schooling: 56.3% did not complete primary school	Cross-sectional	To verify the presence of frailty in a group of elderly people registered in a Health Unit, through the application of the Edmonton Frail Scale, and the applicability of this scale in Primary Care	Embu (SP)	EFS	Only 103 elderly people who answered all the questions on the scale had the degree of frailty assessed. Of these: Frail: 30.1% (light, moderate and severe) Apparently vulnerable: 21.4% The 25 who failed to answer any question were vulnerable to frailty	Not explored
Mansur et al.[56]	146 patients (86 on conservative treatment, 37 on hemodialysis and 23 on peritoneal dialysis)	Sex: Female: 49.3% Male: 50.7% Age: 57.7 (±13.1) Schooling: not explored	Cross-sectional	To evaluate the prevalence of frailty and associated factors in patients with chronic renal disease in conservative treatment, hemodialysis and peritoneal dialysis	Juiz de Fora (MG)	Johansen et al. 2007	Frail: 38.4%. Pre-frail: 39.7% Non-frail: 21.9%	Low level of physical activity among the pre-frail (83.6%) and muscle weakness among the frail (100%)
Mansur et al.[57]	57 pre-dialysis patients from a Federal University outpatient clinic	Sex: Female: 41% Male: 59% Age: 60 (±11,5) Schooling: not explored	Longitudinal	To evaluate the relationship between frailty and endothelial dysfunction in Brazilian pre-dialysis patients with chronic renal disease, and to evaluate the impact of frailty on all causes of mortality and the need for renal replacement therapy	Juiz de Fora (MG)	Johansen et al. 2007	Frail: 42.6% (46% of these cases occurred among non-elderly patients)	Not explored
Mori Lin et al.[58]	534 older adults admitted to a Geriatric Day Hospital	Sex Female: 63.5% Male: 36,5% Age: 79.6 (±8.4) Schooling: 5.3 years (±4.7)	Prospective cohort	To compare the performance of three frequently used frailty instruments in the prediction of adverse outcomes in a 1-year follow-up among elderly initially admitted to an intensive care setting in low-income countries	São Paulo (SP)	Fried et al. (5 components) SOF (3 components) Frail Scale (5 components)	Fried et al: Frail: 51% SOF: Frail: 38% Frail Scale: Frail: 37%	Not explored

CHS: Cardiovascular Health Study; EFS: Edmonton Frail Scale; MCI: Mild Cognitive Impairment; SOF: Study of Osteoporotic Fractures

Table 2. Continued...

Study	Sample	Participants	Design	Aim	Study city	Instrument used for screening frailty	Prevalence of frailty	Components of frailty
Ramos et al.[59]	639 community older adults	Sex: Female: 64% Male: 36% Age: 70.6 (±7.8) Schooling: 3.7 years	Cross-sectional	To evaluate the prevalence and factors associated with depressive symptoms in community-based elderly	Montes Claros (MG)	EFS	Frail: 33.6% Non-frail: 66.4%	Not explored
Santiago e Mattos[60]	442 institutionalized older adults	Sex: Female: 31.9% Male: 68.1% Age: 75.0 (±9.9) Schooling: 68.5% literate	Cross-sectional	To estimate the prevalence of frailty and to identify factors associated with frailty in individuals living in long-term institutions for the elderly	Rio de Janeiro (RJ), Juiz de Fora (MG), Campo Grande (MS) and Cuiabá (MT).	Tilburg Frailty Indicator Frail>=5 Physical component: 0-8	Frail: 52%	The mean score was higher in the physical domain: 2.8 (1.7) and psychological: 1.3 (0.9)

CHS: Cardiovascular Health Study; EFS: Edmonton Frail Scale; MCI: Mild Cognitive Impairment; SOF: Study of Osteoporotic Fractures

A total of 42.6% of the studies were conducted with community-dwelling older adults[15,17,19,20,22,24,26,30-33,39,41,42,45,48,51-53,59]. 40.4% were conducted with older adults at clinics or healthcare services[14,15,18,23,27,29,35,37,38,40,43,44,46,47,49,55-58] and 14.9% were conducted with institutionalized or hospitalized older adults[25,28,34,36,50,54,60] and one study was carried out with elderly university workers[21].

The prevalence of frailty ranged from 3.0%[53] to 58.0%[31] among community-dwelling older adults, 9.2%[27] to 59.0%[15] among older adults evaluated at clinics and healthcare services and 26.3%[25] to 74.1%[54] among institutionalized or hospitalized older adults.

The female sex was predominant in 72.3% of the studies[16-18,21,22,24,27-42,44-49,51,52,54-56,60].

Mean age ranged from 55.0 (range 50 to 83 years)[43] to 85.0 (SD: 5.6 years)[31]. One study failed to report the age of the participants[16], one study only presented the median age (79.0 years)[28], seven studies only presented the age group with the largest percentage of participants[15,22,26,30,49,53,54] and one study[44] presented the average age according to each frailty classification group. Mean schooling was described in 11 studies[23,24,33,34,36,42,46-48,52,58] and ranged from 2.5 (SD: 2.6)[42] to 11.9 (SD: 4.7)[47] years of study. Thirty studies (63.9%)[14-18,20-22,25,26-32,35,37-39,41,43,45,49-51,53-55,60] described the prevalence of schooling: 76.7% of these studies had a sample with a higher prevalence rate of illiterate individuals or those with one to four years of schooling[25,26,30,35,37-39,41,45,50,54,55,60] and 23.3% of the studies evaluated individuals with eight or more years of schooling[21,27,31,33,34,47,53]. Five studies did not investigate schooling[19,40,44,56,57].

Twenty-three studies analyzed the socio-demographic characteristics in the frailty groups (48.9%)[16,17,19,22,24,26,28,31,34,36-41,43,46,47,49-51,53,56]. In 15 of these studies (78.3%), the prevalence of frailty was higher among women, individuals aged 75 years or older and illiterate individuals or those with a low level of schooling[16,17,22,26,28,31,34,36-38,40,43,47,49-51,53,55]. In three studies, the prevalence of frailty was higher among men[19,41,46]. No difference between sexes was found in the two studies[24,29].

Among the 31 studies that used the phenotype of the five biological components[8] to screen for the syndrome[14-44], the prevalence of frailty ranged from 8.5%[22] to 59.0%[15], the prevalence of pre-frailty ranged from 16.8%[41] to 62.5%[21] and the prevalence of non-frailty ranged from 4.0%[36] to 80.1%[39]. Two studies presented the combined prevalence of frailty and pre-frailty (70.8%[18] and 85.71%[28]).

Among the 16 studies that employed other assessment tools to screen for frailty[45-60], nine (56.2%) used the Edmonton Frail Scale (EFS)[45,48,50-55,59], one used the same scale together with the scale developed by the Cardiovascular Health Study (CHS) based on phenotype of the five biological components[47], one used this same phenotype together with the FRAIL-BR scale[46], two studies used the scale for patients on dialysis[56,57], one study used the Tilburg Frailty Indicator (TFI)[60], one study used a self-report assessment tool[49] and one study used three scales together (Fried et al., SOF Frailty and FRAIL Scale)[58].

Among the studies that employed the EFS[45,48,50-55,59], one only described the prevalence of frailty in a general way (41.3%)[45]. In the other studies, the prevalence of frailty (mild, moderate or severe) ranged from 1.2%[51] to 74.1%[54]. The prevalence of prefrailty was described in one study (39.7%)[56]. The prevalence of apparent vulnerability and non-frailty ranged from 16.0%[53] to 26.7%[50] and 3.7%[54] to 81.0%[53], respectively.

In the study involving both the phenotype of the five biological components and FRAILBR scale, the prevalence of frailty and non-frailty was 23.3% and 20.16%, respectively, using the latter scale and 14.3% and 24.19%, respectively, using the phenotype[46].

In the study comparing the EFS and the scale developed by the CHS based on the phenotype of the five biological components[47] the prevalence of frailty, pre-frailty and non-frailty using the CHS scale was 30.0%, 70.0%, and 0.0%, respectively, among individuals with cognitive impairment and 26.93%, 65.38% and 7.69%, respectively, in the control group. The prevalence of frailty, pre-frailty and non-frailty using the EFS was 7.5%, 62.5%, and 30.0%, respectively, among individuals with cognitive impairment and 3.85%, 34.61% and 61.54%, respectively, in the control group.

In the study that used the Fried et al. phenotype, SOF Frailty scale, and Frail Scale, the prevalence of frailty was 51.0%, 38.0%, and 37.0%, respectively[58]. In the study that employed

a self-report scale for the evaluation of the syndrome, the prevalence of frailty, pre-frailty and non-frailty were 43.4%, 37.0% and 19.5%, respectively[49].

The two studies that employed the scale for patients on dialysis reported frailty prevalence rates of 38.4%[56] and 42.6%[57]. Only one of these studies reported rates for pre-frailty (39.7%) and non-frailty (21.9%)[56]. The study that employed the Tilburg Frailty Indicator (TFI) only described the prevalence of frailty (52.0%)[60].

Among the studies listed in Table 1, thirteen (42.0%)[16,17,19,20,24,29,31-33,35,36,40,43] described the most frequent components of frailty: low level of physical activity[16,19,36,40,43], followed by fatigue[17,24,29], slow gait[20,31] and unintentional weight loss[33,35]. Among the studies listed in Table 2, only two (13.3%)[56,60] investigated the most frequent components: low level of physical activity among pre-frail individuals and weakness among frail individuals[56]. And one of these studies reported a higher score on the physical domain: for the 15 items distributed among the physical, psychological and social domains, the participants scored higher on items related to general health state, weight loss, difficulty walking, balance, weakness, poor vision/hearing and weariness[60].

DISCUSSION

Frailty syndrome has been the topic of previous reviews, but data from Brazil were compared to data described from other countries[61,62]. Therefore, the present review was conducted to compare data from Brazil on the prevalence of the syndrome, analyzing the clinical and demographic characteristics of the samples and methods used for the diagnosis.

A previous review analyzed evidence from developing countries on the prevalence of frailty, its definition, and associated factors[62]. Among the 14 studies included in the analysis, six were Brazilian. Another recent systematic review analyzed the prevalence of frailty in low-income and medium-income countries, and 27 of the 70 studies analyzed were Brazilian[63]. These findings demonstrate the growing interest in this topic in the country.

Research on this issue is significant, as the proportion of older adults increases every year in Brazil and this phenomenon has been drawing greater attention from health professionals regarding how to ensure better living conditions for the aging population.

It is, therefore, necessary to understand frailty syndrome in order to enable its early detection and contribute to the establishment of health intervention policies[64].

Over the years, frailty has been the object of Brazilian studies in different fields of knowledge. However, there is no consensus on the screening and diagnosis of this syndrome[64], which leads to difficulties with regard to preventing the impacts of this syndrome on the daily lives of aging individuals. Despite the variety of screening tools, the present systematic review demonstrates that most studies use the phenotype with five biological components to screen for frailty. This choice suggests that most studies carried out in the country seek to understand the biological aspect of frailty syndrome. The same finding has been reported in other reviews on this topic[65,66].The findings of the present review demonstrate a higher prevalence rate of frailty in Brazil, which differs from previous reviews that found a higher prevalence rate of prefrailty[67,68]. The lack of a consensus on the definition of the construct leads to a variety of screening tools and divergent prevalence rates, which hinders the comparison of the data, as the prevalence of frailty syndrome varies depending on the assessment tool employed, the region in which a study is conducted and the population analyzed[69]. However, the fact that the present systematic review has demonstrated the high prevalence of frail individuals in the country suggests that assessing the syndrome early and investing in the management of its related factors should be a priority of our public health system.

A longitudinal study involving middle-aged and older adults in 10 countries found that 37.4% of the participants aged 50 years or older were pre-frail[70]. This fact underscores the importance of the early diagnosis of pre-frailty to enable timely interventions that could help avoid the progression to frailty when such individuals become older[71-74].

Studies using other screening tools also demonstrate a wide range in prevalence rates, but not all assessment tools classify individuals on three levels (frail, pre-frail and non-frail).

This aspect may be due to the differences in the assessment tools employed and the specific objectives of each study.

Studies involving samples of institutionalized or hospitalized older adults[25,28,34,36,50,54,60] found higher prevalence rates of frailty (26.3%[25] to 74.1%[54]). Such findings may be explained by the fact that the aspects that contribute to the development of this syndrome are very common in this population[75]. In a follow-up study conducted in 2008 and 2013 involving 262 community-dwelling older adults in the city of Ribeirão Preto, Brazil, 37.4% of those classified as frail reported having been hospitalized, suggesting that frailty is a possible predictor of such events[76].

In studies conducted with community-dwelling older adults[15,17,19,20,22,24,26,30-33,39,41,42,45,48,51-53,59] the prevalence of frailty ranged from 3.0%[53] to 58.0%[31]. The divergence in this population may be due to factors that involve the heterogeneity of the aging process, such as socioeconomic vulnerability, the non-enrolment in healthcare services and the presence of comorbidities[2]. These findings lead one to reflect on the importance of greater attention from the healthcare system with regards to accompanying older adults in the community, as the symptoms of frailty syndrome may be silent and affect a large portion of the apparently healthy older population[77,78].

The prevalence of frailty differed depending on the region in which the studies were conducted, ranging from 3.85%[55] to 59.0%[15] in the southeastern region and 16.9%[37] to 74.1%[54] in the northeastern region. The greater prevalence of the syndrome in the northeastern region may be explained by the profile of the populations, social determinants, socioeconomic factors, lifestyle and social support[79], since frailty syndrome is a multidimensional construct[80].

The female sex, advanced age and a low level of schooling are common variables in frail individuals[31,81,82], as observed in the present review. During the aging process, women have a greater physiological loss of muscle mass, which is an important predictor of sarcopenia (one of the five components of frailty)[8,83]. Although not a risk factor for frailty, a low level of schooling can lead to a reduction in the quality of life of aging individuals, which exerts an influence on the occurrence of the syndrome[84].

In the present study, the most frequent components of the construct of frailty syndrome were a low level of physical activity, fatigue and muscle weakness. The presence of at least three components is a predictor of mortality in the short term[85]. Therefore, the early identification of the components of this syndrome can contribute to the avoidance of its progression[19].

A study conducted in Canada with 1643 community-dwelling older adults examined associations between each of the five components of the frailty phenotype and deficiencies in instrumental activities of daily living[86]. The authors found that a low level of physical activity was an important component in the level of frailty. This observation may explain the findings of the present systematic review. This result also underscores the need for interventions aimed at improving the level of physical activity in the elderly in order to prevent the progression of the syndrome.

Although not the most frequent component of the construct in the present study, muscle weakness seems to be the first to emerge during the establishment of frailty syndrome[87]. This may be explained by the fact that muscle strength is a more direct measure of sarcopenia, which is one of the components of the frailty triad, along with neuroendocrine dysregulation and immunological changes[88]. The components of frailty syndrome may explain the progression of the condition and therefore merit particular attention[38].

The present study has some limitations. We can have missed some papers that were not indexed on the selected databases. In addition, we did not perform a meta-analysis due to the heterogeneity of the studies which could provide unreliable results. Our systematic review focused on describing the differences between the Brazilian studies considering several methodological aspects.

CONCLUSIONS

This systematic review conducted with 47 studies showed that the prevalence of frailty syndrome in Brazil ranges from 3.85% to 74.1%. Several methods are used to track fragility, the most widely employed of which is the phenotype with five biological components. With

regards to the characteristics of the samples, most studies were conducted with community-dwelling individuals, women, individuals with low education and age between 55 and 85 years.

This systematic review shows that many elderly people are classified as frail in Brazil. Thus, the early detection of this syndrome, especially in primary care services, is essential, as it can enable the planning of interventions aimed at preventing or slowing its progression. Moreover, it is important for researchers to take into account the profile of the older people being assessed in order to understand the relationship between these factors and the syndrome.

This review also shows that there are many tools to screen the syndrome. This variety of instruments can explain the discrepancy between the prevalence rates found in the studies. Therefore, a unified method of screening for frailty is fundamental to allow the comparison of these rates in populations with distinct characteristics, especially in a country with cultural diversity and regional disparities, such as Brazil.

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